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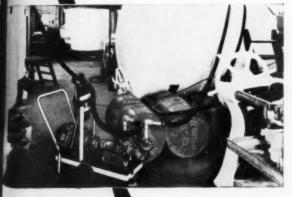
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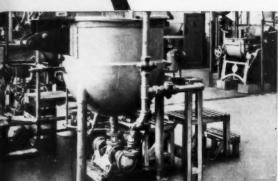
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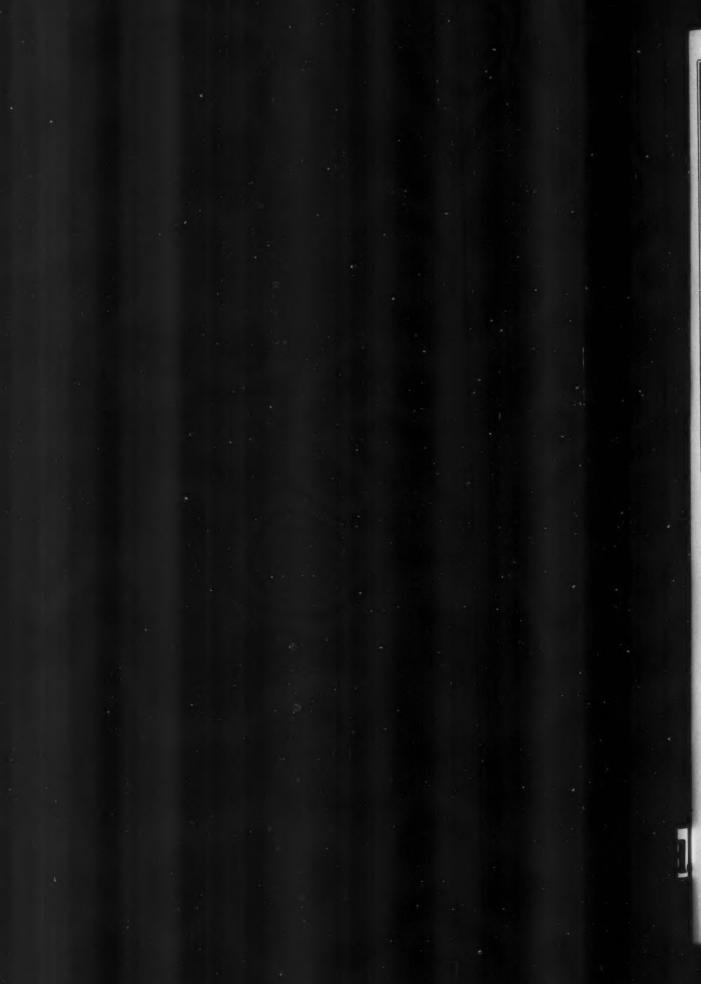
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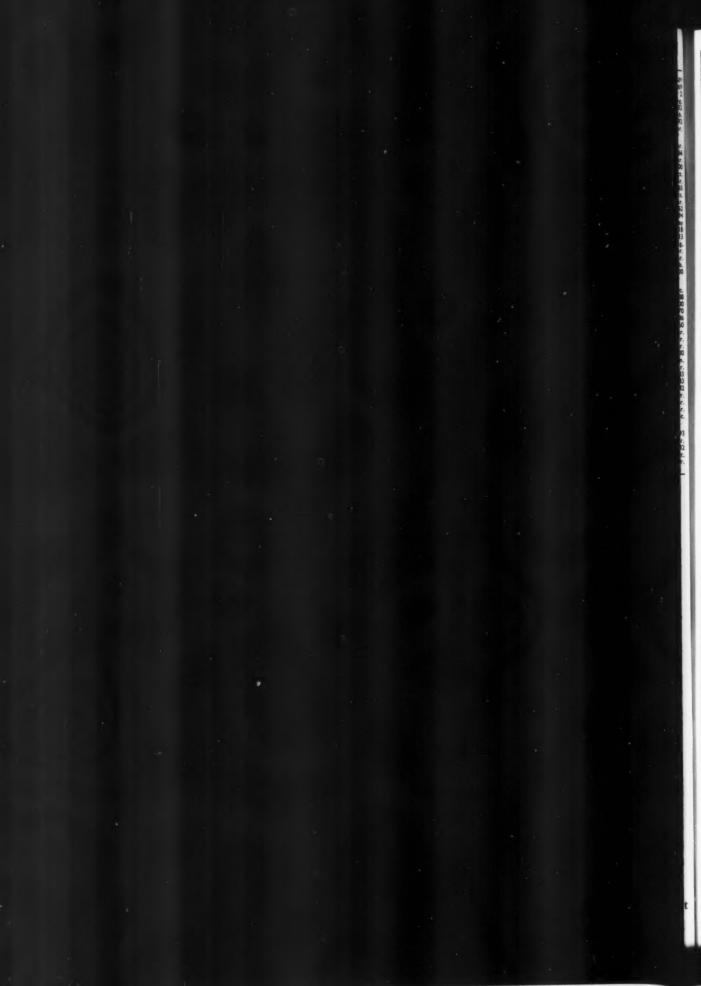
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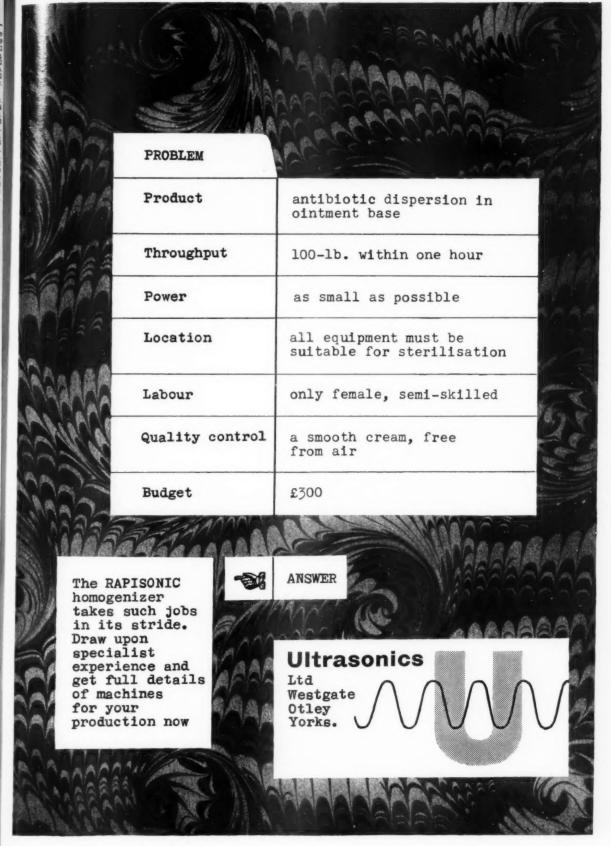
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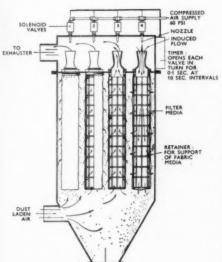
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The dust laden air is fed into the cabinet by suction or pressure. The air passes through the filter media leaving the solid material on the outside of the cylinders which are cleaned periodically and automatically by a high velocity air current operating in the reverse direction to the main flow.

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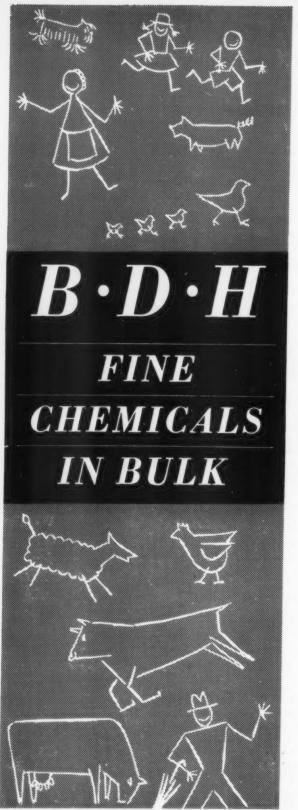
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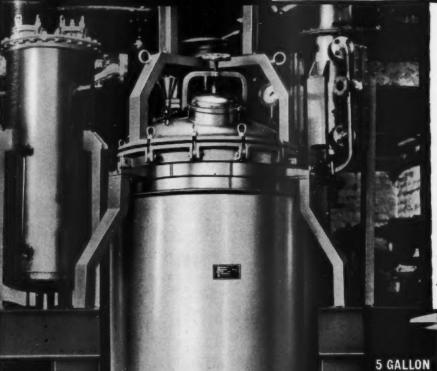
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Isomantles as shown here on a 100 gallon vessel are made for plant up to 1,000 gallon capacity.

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Please send for leaflets and let us help you with your heating problems.

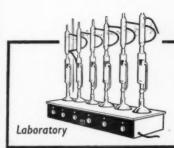
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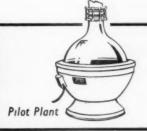
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PILOT PLANT

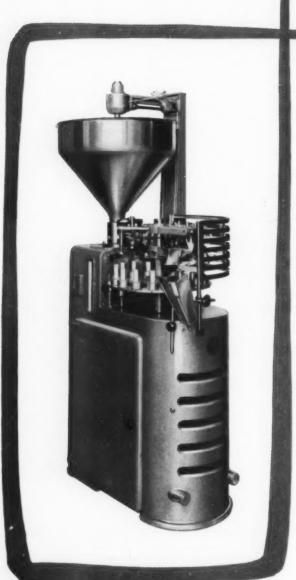


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#### **KALIX-DUPUY SUPER RV7**



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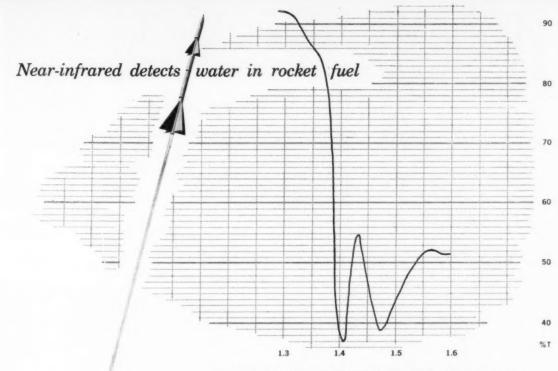
When it comes to sheer versatility, top marks go to the Kalix-Dupuy RV 7! For this machine fills tubes of all sizes, from 1 drachm to 8 fluid ounces, and can handle literally any material from liquid to stiff paste. Moreover, the RV 7 fills jars, tins and bottles as well-so there's no fear of its spending idle hours awaiting suitable work. Compact and reasonably priced the Super RV 7 is the rational choice for those manufacturers who must fill short and medium runs of containers yet are anxious to enjoy the benefits of automatic filling.

We will be glad to send you further details of the Super RV 7, or arrange a demonstration.

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Water shows up at 1.4 microns in this near-infrared spectrum of fuming nitric acid.

The curve was run in less than a minute on a Beckman DK-2 Spectrophotometer.

## Beckman® DK Automatic Recording Spectrophotometer pioneers new spectral region

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Manufacturing Chemist—April, 1958

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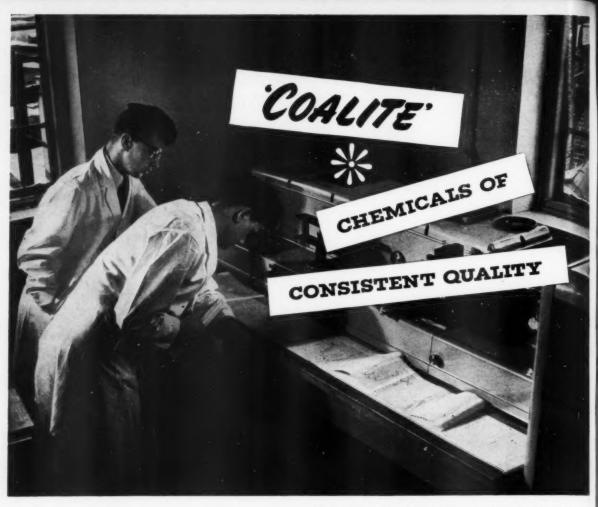
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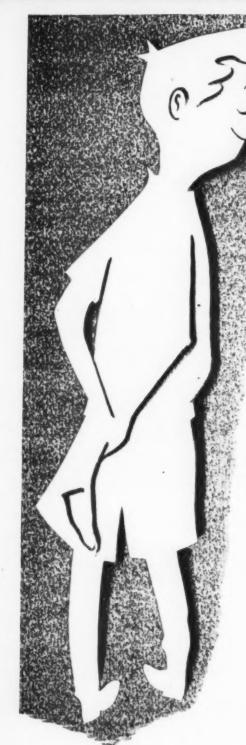
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Manufacturing Chemist—April, 1958

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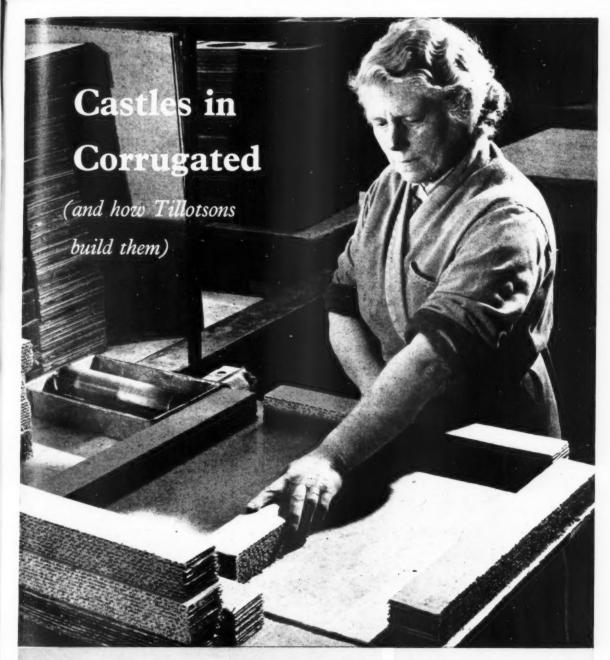
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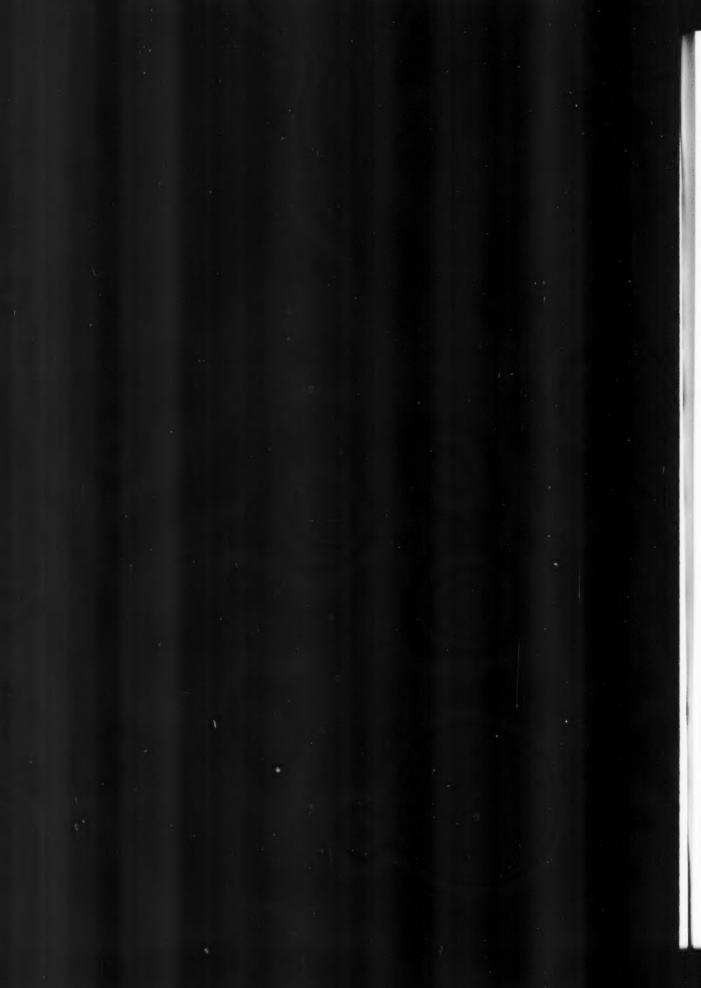
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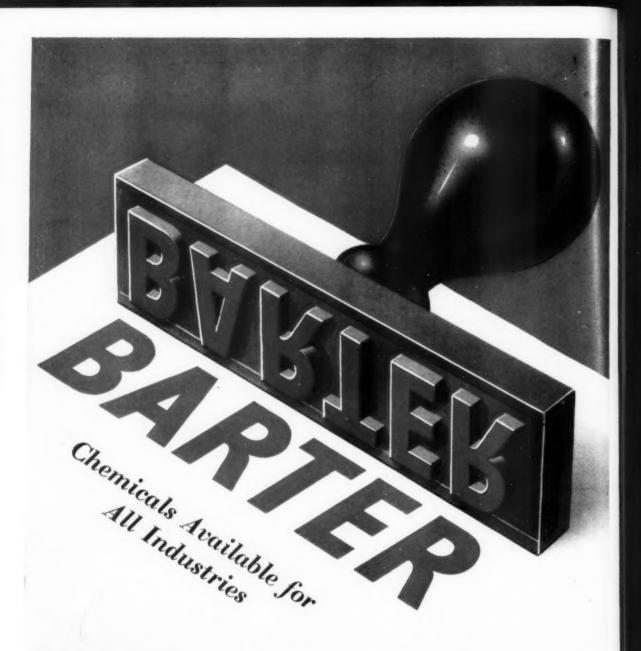
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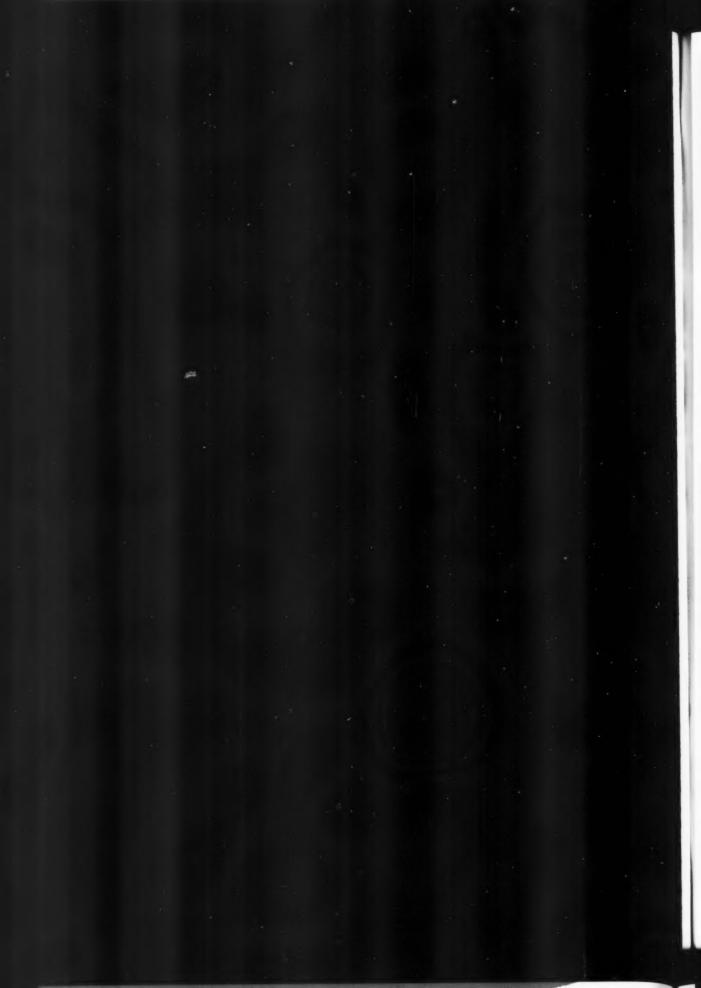


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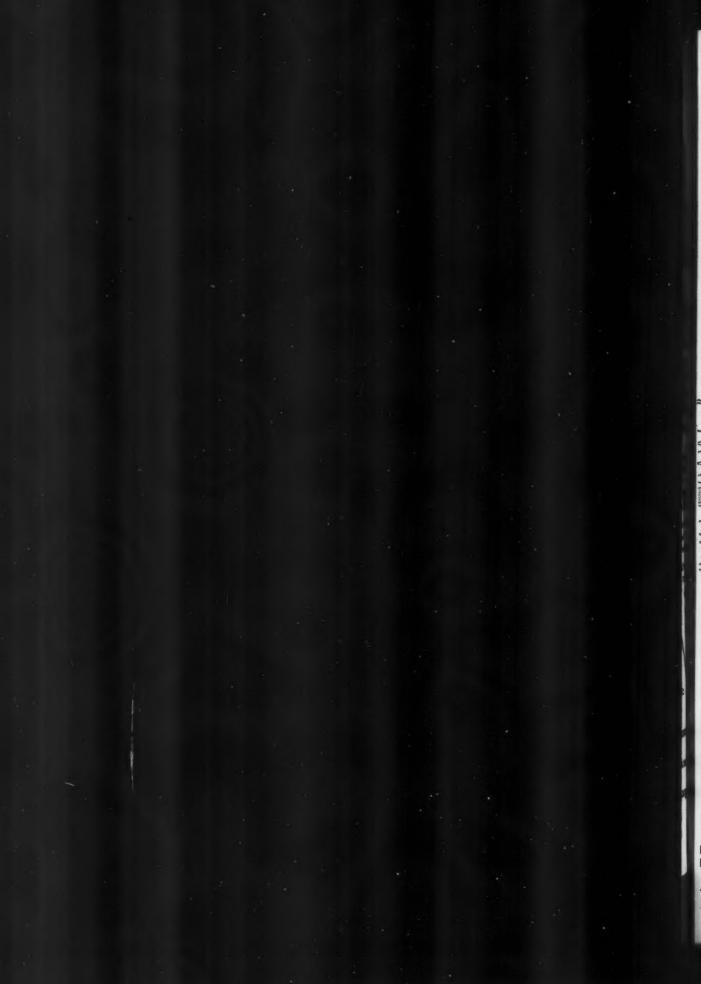
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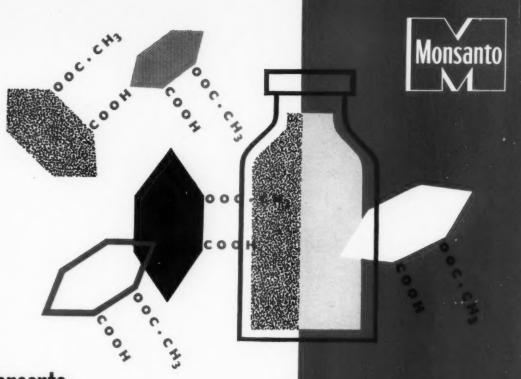
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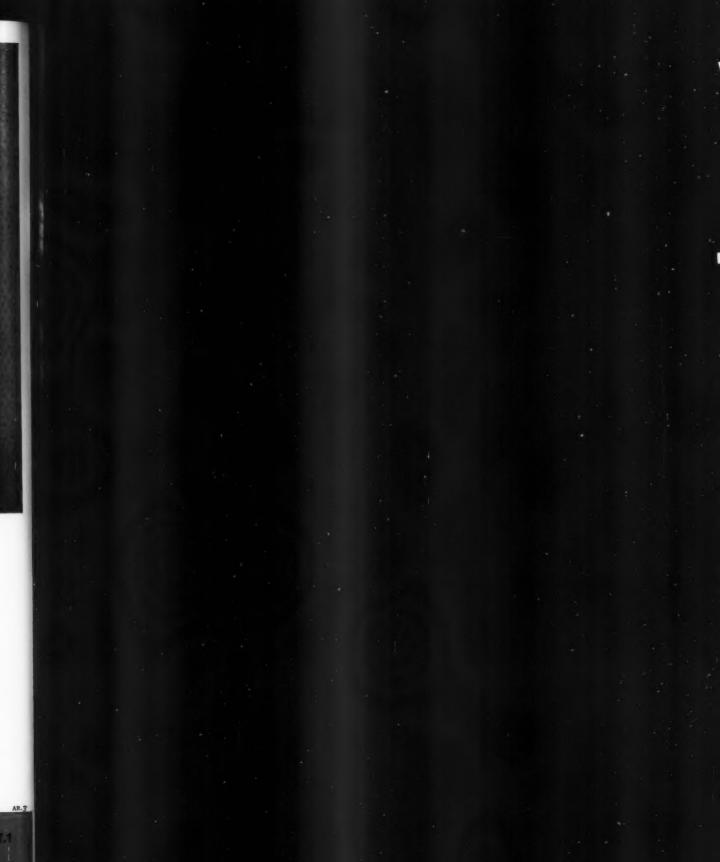
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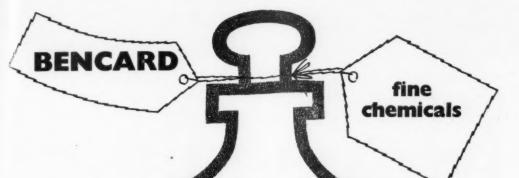
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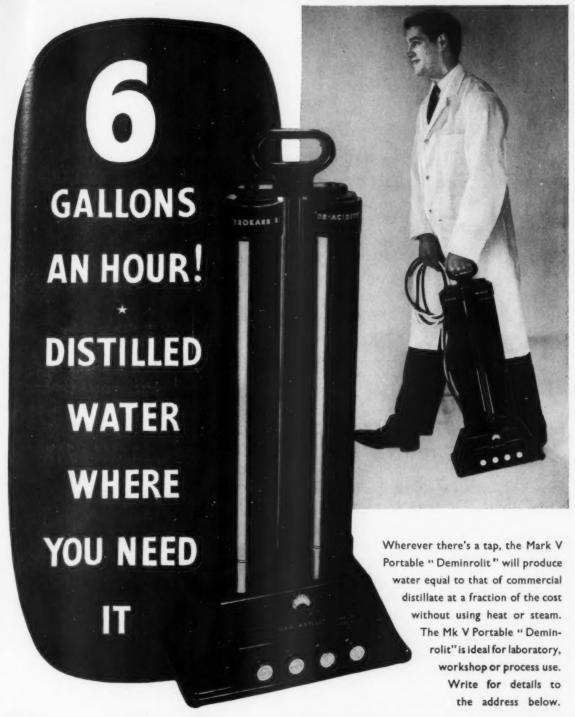




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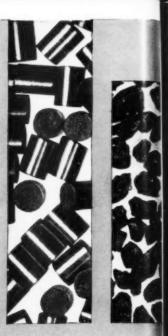
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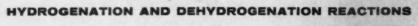


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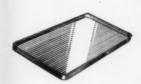


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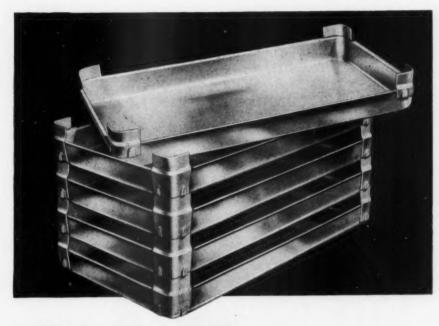












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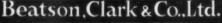
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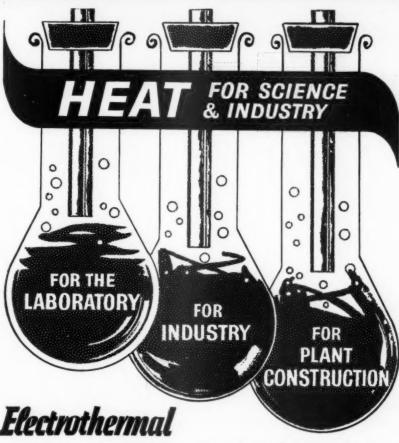






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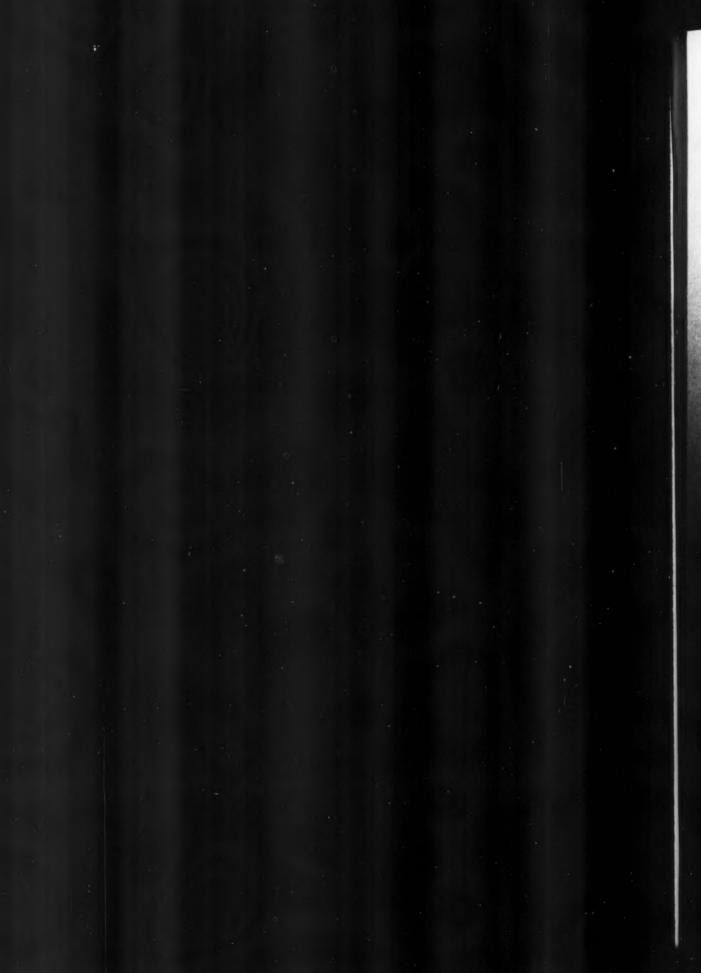
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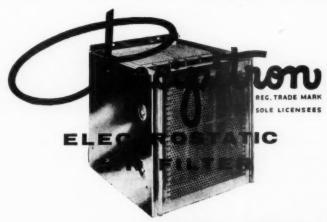
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### MANUFACTURING CHEMIST

and Manufacturing Perfumer

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# TOPICS AND COMMENTS

# New inventions, chemical and otherwise

THE National Research Development Corporation is now eight years old. Its assets are mainly patent rights having an effective life of up to 16 years. Therefore in a sense the Corporation has reached a half-way mark, the view being held that only after 1965 will it be possible to pass judgment on its achievements and prospects. Caution rather than confidence is still predominant in its public utterances, notably its annual report.

The Corporation's revenue from the exploitation of its inventions is increasing; in 1956-57 it came to £121,889 plus £17,866 profit on the manufacture and sale of a computing machine. In 1955-56 the total revenue was only £75,912. Even with the improved revenue, however, the Corporation's spending exceeded its income by £231,016 in 1956-57; £68,740 of this was interest on advances made by the Board of Trade.

Chemists will be interested to learn that of the 19 inventions which the Corporation have licensed and which provide royalties, eight are pharmaceutical and chemical. Five are fairly well known, namely antithyroid compounds, fire-fighting foam based on animal protein, hecogenin from sisal (for cortisone manufacture), the Ministry of Supply insecticidal bomb, and Professor Wain's phenoxybutyric acid weedkillers which are non-toxic to valuable crops such as clover, hitherto sensitive to weedkillers of this type.

The three new chemical inventions now earning royalties are: Pesticidal paints. Tri-iodothyronine, discovered by Dr. Rosalind Pitt-Rivers and Dr. J. Gross, which is valuable for the treatment of disorders associated with the impairment of the thyroid hormone function. Nisin, an antibiotic which has been developed by Aplin and Barrett as a food preservative.

Among projects now being developed is an improved process for producing acetylene by partial combustion of methane. This is being pursued at Imperial College, where an improved combustion system has been developed. Arrangements are being made to continue the work at the Isleworth Sewage Works, where methane is available in sizeable quantities from the sludge digestion process in operation there.

Another project of chemical interest is a novel machine for small-scale liquefaction of atmospheric gases. It has been invented by Mr. H. Sixsmith of Reading University and a prototype has been constructed there with Corporation aid. This machine is supplying most of the University's requirements for liquid air. A firm is now very interested in making and selling the machine.

A new development project is the manufacture of aldosterone by a tissue incubation technique invented at the Middlesex Hospital Medical School. The small quantity being made is for experimental work. Another hormone project is an attempt to elucidate the structure of the estrogenic substance, mircestrol, from the plant *Pueraria mirifica*. This work, with the ultimate aim of synthesis, is in progress at the National Institute for Research in Dairying and the Courtauld Institute of Biochemistry.

Space prevents us from doing more than mention several other intriguing projects, e.g. the hydrogen-oxygen fuel cell, towing oil in flexible barges, improved ion-exchange membranes and electrodialysis cells, a regenerative mechanical transmission system, and the ultrasonic freezing of milk and cream. There seems no lack of inventive ability in Britain and the N.R.D.C. is certainly helping to apply the fruits of this inventiveness.

### How to beat corrosion

A first-class survey of corrosion and the means for preventing and controlling it is now available in the form of the Proceedings of the Corrosion Convention entitled *Industry Fights Corrosion*. Published by *Corrosion Technology*, the journal which sponsored the Convention and the Exhibition held at the same time, this book gives in full all 13 papers presented, plus reports of the vigorous and very often prolonged discussions that followed each paper.

These are practical papers, written by practical men. The discussions are critical, forthright and lucid. Since corrosion afflicts the chemical industry more than any other, the book is enjoying a wide sale among chemical engineers, managers and technologists in the industry. Of special interest are such papers as "Protection of plant and equipment in the petroleum and chemical industries," "Packaging to prevent corrosion," "Corrosion and water treatment," "Paints against corrosion," "Selection of corrosion-resistant metals and alloys," "Vinyl resins in the construction of chemical plant," "Cathodic protection," "Sprayed metal and plastics coatings" and "Anti-corrosion coatings for buried pipes."

Almost every paper is fully illustrated and the standard of paper and printing is excellent. There are 140 pages,  $8\frac{1}{2}$  in.×11 in. The book is one of the best compilations of anti-corrosion information we have seen and it deserves a wide sale in the chemical industry and, in fact, in all industries coping with corrosion problems. It costs one guinea, post free, from The Publishers, Leonard Hill House, Eden Street, London, N.W.I.

# Chemical engineers: a brighter picture

THE universities and technical colleges have responded extremely well to the need for more chemical engineers. By 1966 there is a good prospect of chemical engineers being turned out at the rate of just under 950 a year compared with the rate of under 300 a year in 1956. This rate is better than the minimum goal for scientists and engineers as a whole given in "Scientific and Engineering Manpower in Great Britain " (H.M.S.O., 1956). But it falls short of the estimates of some leading chemical engineers who would like the country to have between 1,000 and 1,500 new chemical engineers a year. Furthermore even in 1966 we shall be producing far fewer chemical engineers proportionately than the Russians and the Americans. In relation to population the U.S.S.R. trains three times as many professional engineers as we do.

The estimates for future accretions of chemical engineers have been made by the Institution of Chemical Engineers from replies to a questionnaire they sent to professors, technical college principals and heads of departments. The growing rate of recruitment to the profession will more than take care of the estimated requirements for 1959, namely an increase of 47% over the number of 1,500 for 1956. The output from the universities alone will be more than enough to meet this requirement, which was made in the H.M.S.O. report

referred to above.

The efforts being made by universities and technical colleges are all the more commendable in view of the great and continuing shortage of teachers. The increase in output achieved to date owes much to the enterprise and improvisation of professors and other senior teachers of chemical engineering. Unfortunately, in spite of these efforts, it will be a miracle if there is not some reduction in the quality of training.

Industry has done much with sandwich courses and part-time day release for Higher National Certificate training. The latter are naturally cheaper and the Institution thinks that industry could give much more encouragement without incurring great expense. But there is a national crisis in this matter and, as the report on the supply and training of teachers for technical colleges (H.M.S.O., 1957) points out, for some years industry must be prepared to lose more than it may appear to gain.

By and large universities are not very hopeful about the expansion of part-time day teaching by members of the staffs of industrial concerns. What is needed in the universities and colleges of advanced technology is the secondment from industry to teaching duties of qualified men without loss of seniority for periods of not less than six months.

Here is a real challenge to the chemical and allied industries. Without this powerful support for a few years at least, the flow of new chemical engineers for industries hoping to expand at the rate of 7-8% p.a. is bound to be throttled.

Advertising claims

IT SEEMS that a partial solution to the balling problem of baldness has been discovered, for we read in the latest (4th) edition of the British Code of Standards for Advertising Medicines and Treatments that the prohibition on baldness cures has been relaxed. Formerly "No advertisement should claim or imply that the product, medicine or treatment advertised will do more than arrest the loss of hair." Now these important words have been added: "but claims to restore lost hair may be permitted provided that they refer only to cases of temporary baldness." Perhaps it is just as well that this relaxation has been permitted, for lately we have noticed a number of advertisements giving pretty strong hints that hair can be restored. And we did not get the impression that this referred only to temporary baldness. When is baldness temporary, anyway? And when does it cease to be temporary? The impression left by the scientific conference on hair held in London last August was that there was no cure for baldness. One American delegate, a 44-year-old University Professor who had been going bald for 16 years, said that all cures are boloney." So be it.

Another innovation in the new Advertising Code is that no advertisements for hæmorrhoid treatments may be accepted unless the following warning notice appears with directions for use on the container itself or its labels: "Persons who suffer from hæmorrhoids are advised to consult a doctor." This is commendable. It would be more commendable if the size of the type had been specified. It is amazing how printers manage to find the tiniest imaginable type for statements that are only printed because manufacturers have to print them. The result is that they are often unreadable by a good proportion of users. For instance...

CAN YOU READ WITH THE NAMED ETE THIS LINE, WHICH IS IN 5PT. SMALL CAPS?

The third change in the Code is that the prohibition of advertisements for fungus infections does not now apply to products for the treatment of Athlete's Foot. This is sensible and, indeed, overdue, for effective remedies for this annoying complaint have been available for some years.

# Chrysanthemumic acid

SYNTHETIC insecticides related to pyrethrum and allethrin have been obtained from chrysanthemumic acid by chemists at the Beltsville laboratories of the United States Department of Agriculture. The big advantage of the new compounds is that they are less toxic to mammals than insecticides now in general use.

Chrysanthemumic acid is a synthetic substance similar to an acid found in flowers of the chrysanthemum family. This acid is found in the molecules of pyrethrum and allethrin. Acute toxicity tests on mammals showed that the new compounds are only one-eighth as toxic as pyrethrum and onethird as toxic as allethrin. Both of the older insecticides have long been considered the "safest."

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In the preliminary laboratory tests on insects, two of the new compounds were shown to be equal or better than either pyrethrum or allethrin at high levels of kill, although somewhat slower in "knockdown." Both were less effective as insect killers than DDT and other hydrocarbons, all of which, however, may leave toxic residues. But the new materials gave good results against larvæ of the common malaria mosquito, the codling moth, the salt marsh caterpillar, and the southern army worm. They also were very effective against the body louse.

The new compounds were developed by W. F. Barthel and B. H. Alexander at Beltsville in studies begun by the Department more than 20 years ago to find insecticides of low toxicity to mammals and high toxicity to insects. To find compounds of low mammalian toxicity, the two chemists synthesised 200 esters of chrysanthemumic acid. Five have shown promise, and two are rated higher than all the rest.

The two best esters of chrysanthemumic acid were made with 6 bromopiperonyl alcohol and 6 chloro-piperonyl alcohol. These esters, while considerably more expensive than DDT and other chlorinated hydrocarbons, can be made at lower cost than allethrin. Further, the new compounds are representative of a group of basic materials from which even more effective compounds of low mammalian toxicity may be developed.

# Russian tests on anti-cancer antibiotics

Russian chemists are using an ingenious technique for screening antibiotics for possible anti-cancer activity. At the Institute for Antibiotic Research, Moscow, they have accepted the truth of Julian Huxley's observation that "neoplastic tumours are widespread in the organic realm" and have set about obtaining the equivalent of cancer cells in microbiology. Using a number of methods they have obtained biochemical mutants of micro-organisms with deficient respiration and probably with other alterations in cell metabolism which are specific for malignant growth. Yeast cells (Saccharomyces cerevisiæ strain AN-2) and staphylococci have been used. Against these "malignant" mutants 2,500 different cultures of actinomycetes have been tested. Of this enormous number only 53 cultures (about 2%) possessed selective inhibitory action against the biochemical mutants of staphylococci with impaired oxidation. Significantly these cultures did not impair the growth of normal staphylococci belonging to different strains. Ten of these cultures produced chemical substances which not only inhibited the growth of biochemical mutants of staphylococci but also inhibited in vitro the cells of ascites tumours found in mice.

Some cultures of actinomycetes which selectively inhibited, in petri dishes, the growth of biochemical mutants of micro-organisms with deficient respiration, produced selectively inhibiting substances in the course of their submerged growth in liquid nutrients. These substances are being isolated in order to examine their chemical structure.

While it is too early to say whether the active substances revealed by these subtle techniques are likely to have any practical use in treating cancer in humans, they are clearly of great theoretical interest. No less significant is the screening technique which represents a definite advance on purely empirical searches for anti-cancer anti-biotics. It is indeed a considerable achievement to have produced a form of cancer in micro-organisms and the possibilities for future tests of inhibitory substances are enormous.

The work was reported at the Pasteur Fermentation Centennial in New York in November by Prof. G. F. Gause of the Institute for Antibiotic Research in Moscow. (See *Science*, 1958, **127**, (3297), 506.)

### The Fertiliser Society

At a dinner held in London recently to celebrate the tenth birthday of the Fertiliser Society, it was revealed that the initial idea of its formation was conceived by two prominent members of the industry during the war when sharing a fire-watching duty at Government offices where their seconded wartime control duties were based. Fairly soon after the war the idea was given practical shape. Though fostered by the Fertiliser Manufacturers' Association, the Society has lived independently as all scientific organisations should. Certainly it has not become the platform of commercial interests or propaganda. From the beginning its Proceedings have established themselves as genuine contributions to technical literature, and anyone who has attended the Society's meetings will have been impressed by the size of audience and vigour of discussion, two features that many older scientific societies may well envy.

Today the Society has 485 members compared with 250 in 1949, and membership is steadily increasing. Overseas membership is increasing and the Proceedings are now being sent to 35 Commonwealth and foreign countries, including the U.S.S.R. and China. One of the primary objectives was to bring together chemists and engineers in the fertiliser industry, providing a forum for the exchange of views. This has been achieved to an extent beyond all original hopes. Some of the papers read to the Society have been outstanding even for post-war British industry in the generosity with which large manufacturing firms have allowed their research results to be openly discussed.

There has perhaps so far been a decided bias towards subjects concerned with manufacture. In the next phase of the Society's life greater attention to the science of fertiliser use can be expected. Indeed, this was a point strongly pressed by Sir

Alexander Fleck when he proposed the toast of the Society at the dinner. Although world fertiliser use has expanded so robustly since 1939, the major problems of development are still those of use; problems of production, even if sometimes troublesome in detail, are minor by comparison. If in the next 10 years the agronomist and the agricultural economist make more frequent appearances on the Society's platform its success will be consolidated. Undoubtedly there is an impression that it exists mainly to stimulate manufacturing technology. This is wrong. Anyone associated with the production or use or application of fertilisers may join it and well-known agricultural scientists from independent research centres have already served on its Council, notably the late Dr. E. M. Crowther of Rothamsted, who also served as president.

The Fertiliser Society is unique in the world. In the U.S. the industry has formed a Round Table for open discussions, but so far this has not also become a society like ours. Within ten years this British effort has acquired a firmly rooted reputa-

tion throughout the world.

#### Molecular fitness

LAVOISIER discovered in 1775 that the same energy was released from a unit quantity of matter whether it was burned in the laboratory or in the living system. He concluded that life is a chemical function. In spite of this, the theory of a life force, distinguishing the materials ordinarily the concern of the chemist from those substances involved in living processes, continued to hold the stage. The life force theory received a shattering blow from the work of Wöhler and Liebig.

The detailed structures of many proteins are now well established. Deoxyribonucleic acid, known as DNA, consists (according to Crick and Watson) of two helical coils of purines and pyrimidines attached to a phosphate sugar chain. A single chromosome may contain 10,000,000 turns of the DNA corkscrew molecule. DNA is believed to be concerned in the fate of the cell; whether it grows into fly, mouse or man; arm, nose or eye. The genetical information is thought to be carried in the arrangement of the

In regard to the physical components of living things, the chemist is taking over from the biologist. The many difficulties involved in determining exactly what a living cell does are being overcome. Techniques developed in analytical chemistry have been used to unravel some of the secrets of plant and animal energetics. The Krebs cycle and the Embden-Meyerhof-Parnas scheme give explanations of how energy is derived from the processes involved

in the utilisation of food.

purines and pyrimidines.

In the recently published third edition of a Russian book by Prof. Oparin on the origin of life on earth, it is stated that the Soviet workers, Pasynskii and Pavloskaya, confirm the earlier American work of S. L. Miller. His classical experiment, carried out in 1955, consisting of circulating a mixture of water vapour, methane, ammonia and hydrogen through an apparatus in which it was exposed to a silent electric discharge, resulted in the production of an assortment of amino acids in surprisingly high yields. It is not such a far cry from here to proteins, vitamins, and even DNA itself. Oparin has made the plausible suggestion that natural selection can be pushed right back into chemistry to account for the development and survival of the fittest of the more complex molecules, capable of preying on simpler molecules.

#### Novel scientists

The problems of the research scientist can only be portrayed by a novelist who is capable of creating

an authentic technical background.

About 30 years ago Sinclair Lewis produced the extraordinarily successful "Martin Arrowsmith," so true to life that research workers everywhere felt that individuals of their own organisation had been deliberately caricatured. The reader, pleasantly and unconsciously, became quite knowledgeable on the subject of bacteriophages in relation to medical research.

Just before the war came the amusing "Sugar in the Air," by E. C. Large, in which an English chemist, who has discovered a method of artificial photosynthesis of sugar from carbon dioxide in the atmosphere, suffers from the frantic and changeable efforts of a large chemical combine to exploit his discovery. Now comes a recent novel, "The Blue Chips," by Jay Deiss. This is about a microbiologist employed by an American pharmaceutical corporation in an all-out drive for the perfect antibioticactive against all bacteria and viruses. The background of antibiotic research and production, and American big business methods, is well done; and modern research workers will chuckle over this book as their seniors did over the other two books we have mentioned.

One must confess that policy and sales directors are rather unkindly treated in novels of this kind. For a good popular appeal it seems essential to picture the seeker after truth as being constantly thwarted, or induced to prostitute his science for filthy lucre. Sometimes he yields to temptation. Executives, on the other hand, are a sinister crew who will do anything to swell the profits (it is always assumed that there are vast profits).

This makes a good story, but in sober fact many scientific workers are almost as interested in their salary cheques as in ultimate truth. Their scales of pay, even today, tend to lag behind those of equivalent executive ranks; but in exchange they

have a less harried existence.

Scientific readers would undoubtedly relish being featured as villains for a change. Perhaps some author will now write the story of a big-hearted industrialist, striving to benefit humanity, but brought to ruin through the machinations and petty jealousies of his despicable research staff.

# Design and Construction of Three New Laboratories

To introduce our special section on laboratories we describe the design, construction, furnishing and equipment of three laboratories in three different branches of the Chemical Industry, namely, photographic chemicals (Ilford Limited), crop protection chemicals (Plant Protection Ltd.) and pharmaceuticals (Ciba, New Jersey).

# The Organic Chemical Laboratories of Ilford Limited

THE Renwick Laboratories of Ilford Limited, situated at the company's headquarters at Ilford, Essex, were opened about three years ago. In them the organic chemical research for all the factories of Ilford Limited is carried out under the direction of Dr. J. D. Kendall. The company makes a wide range of chemicals used in the manufacture and processing of materials for both blackand-white and colour photography, these chemicals including organic intermediates, sensitising and desensitising dyes, photographic developers, antifogging agents, light sensitive diazonium compounds and colour formers. The responsibilities of the organic chemistry research laboratories are therefore quite wide.

The laboratories, which are named after Ilford's first director of research, replace smaller premises at the Rodenside laboratory, in the nearby factory. They stand on their own site with a long frontage to the road. Behind them lie stores for bulk chemicals and certain hazardous materials, and the fuel oil storage tank.

#### Layout

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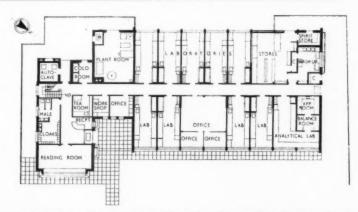
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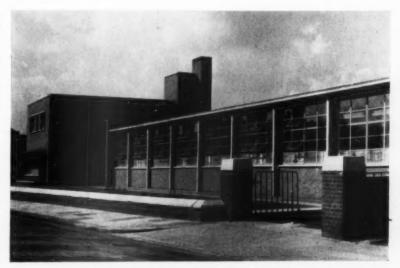
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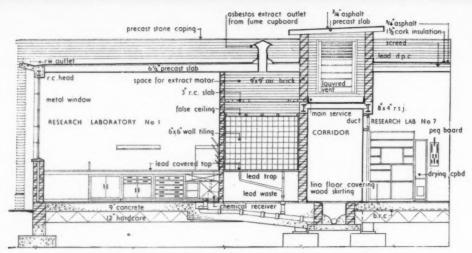
The building consists of a singlestorey laboratory wing with a two-storey administrative section at one end. The entrance hall, library and cloakrooms are on the ground floor of this section. At the rear are the autoclave and cold rooms. On the first floor is Dr. Kendall's office suite and private laboratory, a photographic dark room used in connection with research on new photographic develo-



Ground-floor plan of the Renwick Laboratories. The north front faces the street. This and the drawings on pp. 138 and 139 are printed by courtesy of "The Architect and Building News."



Frontage of the Laboratories. The two-storey block houses the reception space and library with the Director's offices and laboratory on the first floor.



Cross section of the laboratories. Note the service duct above the main corridor.

pers, and a special room containing Azoflex diazotype copying materials and equipment.

At right angles from the entrance hall runs a wide corridor off which lie on either side the laboratories, offices and other rooms. First is the autoclave room in which highpressure reactions, aminations, etc., are done; it does not open directly into the corridor. Next, but separated by a passageway, is the cold room containing two separate compartments, built in between brick walls, the whole insulated by 3 in. of cork slab and finished internally with stipple glazed asbestos sheeting. compartment has a capacity of 50 cubic feet. One is kept at 0°C. and the other at -5°C. The temperature is controlled by a thermostat in each compartment, and the plant is fitted with automatic control gear. The refrigerator is driven by a 3 h.p. electric motor and fitted with an air-cooled condenser. Solid CO2 is available for lower temperature work and ice is also provided.

Next is the plant room which houses two oil-fired boilers, one for steam and the other hot water, a calorifier for heating water from waste steam, an air compressor, a water booster for central vacuum supply and a still providing the central supply of distilled water. Connected to the plant room and running over the main corridor is a duct accommodating the services—

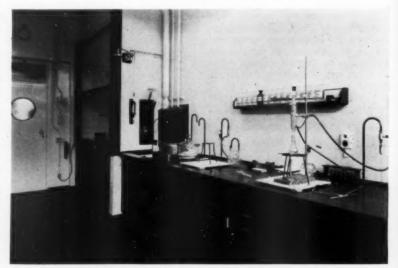
gas, electricity, compressed air, steam and water. Expansion joints are arranged in the brick walls of this duct to offset thermal movement.

Access to drainage is obtained through manholes located in the corridor outside each laboratory; repairs and maintenance can thus be done without disturbing work in the laboratories.

In the old laboratories all work was done in one large room. Dr. Kendall believes that this causes too much distraction for effective work, so in the new building nine individual laboratories have been provided, one for every graduate worker and his assistants.

#### Laboratory design

Each laboratory measures 24 ft. by 10 ft 3 in. wide, the object being to give every worker 16 ft. of bench space. Each has a 7 ft. fume cupboard, unobstructed by central supports and provided with separate ventilation, the extract ducting discharging through the roof. The drainage system in each laboratory is separate from



One of the standard laboratories. Each worker has 16 ft. of bench space. The 7 ft. fume cupboard is a standard design.

that of the other laboratories. Under each fume cupboard are cupboards for noxious chemicals and these are vented to the laboratory exhaust system. The basic services—steam, gas, compressed air, low-pressure water, distilled water and boosted water for filter pumps—are identified by means of differently shaped knobs. Each laboratory has its own high vacuum pump for use in vacuum distillations.

Other standard equipment is a steam-heated drying cabinet, a shower for drenching in case of accident, a rough balance, a student's balance and a hot and cold water blender.

The laboratory furniture is of oak with teak bench tops. A simple but effective idea is captive drawers; it is impossible to pull them out and spill fragile laboratory ware on to the floor. One section of the bench is adjustable in height, a Continental idea with obvious advantages for the handling of large apparatus and difficult manipulations. Plastic splash panels are fitted behind the benches.

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A full supply of apparatus is kept in each laboratory, but a reserve supply is held in a central store. Another central department is the wash-up section. Apart from ensuring that no dirty apparatus containing hazardous materials passes to the wash-up, the laboratory worker is not expected to spend his time washing glass apparatus; all this is done



Light and airy, each laboratory provides over 240 sq. ft. of floor space.

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removable panel
line of bench top over

angle panel piece

Detail of typical bench; scale 1 in. = 16 in.

in the central wash-up, a system being increasingly adopted in chemical laboratories.

There is a small writing desk in each laboratory for the assistants, but for senior workers there is a central office where they can read and dictate. This, incidentally, provides a "common room" atmosphere which overcomes the segregating effects of separate laboratories. Smoking is permitted in this office and in the library, but not in the laboratories.

The tenth laboratory is bigger than the rest. It is staffed by girls who carry out micro and semi-micro analysis. Generally each girl specialises in one analytical technique, e.g. for carbon and hydrogen, nitrogen, sulphur, etc. Leading off this laboratory is a

balance room and beyond that a room for physical apparatus spectrophotometry, refractometry, microscopy and so on.

In the stores reagents and other supplies are kept on racks. Sliding door cupboards are provided for glassware, porcelain, etc. Off the main stores is a locked room reserved for bonded alcohols and inflammable liquids. In the central wash-up glassware, etc., is washed in detergent and finally rinsed in distilled water before being dried in a steam-heated cabinet which opens directly into the stores.

The laboratories are admirably designed and equipped and well lit with both natural and fluorescent lighting. The lamps are designed to operate out of phase to avoid the annoying flicker which can be a nuisance with this type of lighting. South-facing laboratories are fitted with Venetian blinds.

The general layout, with ample cupboard space and the central wash-up system, encourages good housekeeping.

Floor finishes vary: thermoplastic tiles for corridors, linoleum for laboratories, acid-resisting asphalt for stores and wash-up room, terrazzo for staircase and laboratories, and granolithic for the plant room.

The Renwick Laboratories were designed by the Ilford Limited Staff Architect's Department, which was also responsible for the film laboratories at Brentwood (see MANUFACTURING CHEMIST, January, 1958). They are admirably functional but possess beauty and spaciousness—a combination deriving from the fruitful co-operation of architect and chemist.

# The R. and D. Laboratory of Ciba Pharmaceutical Products Inc.

A \$1,000,000 building devoted to industrial pharmacy research and development was recently added to the Summit, New Jersey, research centre of Ciba Pharmaceutical Products Inc. In it a staff of 18 work under the direction of Mr. Jack Cooper. One group of laboratories is used for research and development on compressed and coated tablets, capsules, dry powders, etc., and

FUTURE EXT.

another is used for research and development on sterile products, non-sterile oral preparations and preparations for external use. There are also laboratories for chemistry, physical instrumentation, microscopy, photography and stability testing.

#### Design and services

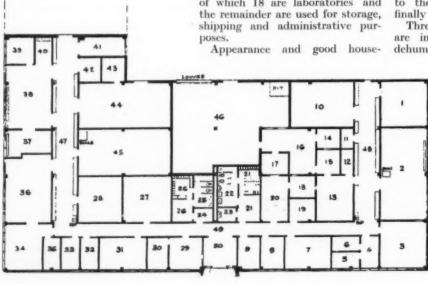
Providing a total working area of 15,500 sq. ft., the one-storey building forms almost an L-shape round a central utility area housing the machinery which supplies the many different services required by the staff. There are 45 rooms, of which 18 are laboratories and the remainder are used for storage, shipping and administrative purposes.

keeping were considered to be as important as safety and control and for these reasons the pipes, conduits and wiring that bring the service facilities from the utility area are housed behind a false ceiling.

Ample space is provided for working areas which are designed according to the type of work being carried out.

For example, the tableting section is designed so that materials flow quickly and easily from the mixing room to the granulating area, to the compressing machine, to the tablet testing laboratory, to the packaging counters, and finally to clinical storage.

Three types of air conditioning are in operation. One system dehumidifies the tablet compressing



#### Layout of new laboratories

Particle size reduction 41, 43, Encapsulation 42. Tablet manufacture 33-40. Liquids and ointments 2. Sterile Products 11-17. Washing area 18, 20. Ampoule storage 19. Facility testing 1, Instruments 4, 5. Chemistry laboratory 3. Materials storage 45. Packaging room 28. Clinical 27. Conference storage room 31. Container research 7. Photographic dark room 6. Offices and foyer 8, 9, 29, 30, 50. Lockers and lavatories 21-26.



A view of the stability room, where drugs developed in Ciba's new pharmacy research and development building are tested under all climatic conditions. The pharmacist is checking a sample of material stored in a room kept at  $40^{\circ}\mathrm{C}$ . Room to the left is kept at  $6^{\circ}\mathrm{C}$ , and the one on right at  $50^{\circ}\mathrm{C}$ . Cabinets on wall at left are maintained at relative humidity of 30 to 90% to determine shelf life of materials stored there. Special ports in each of stainless steel cabinets permit insertion of temperature and humidity probes. Dial type thermometers are mounted on the front edge of the shelves and are visible through window.

and encapsulating laboratories at 40% relative humidity so that the mixing and compressing machines give maximum efficiency. Another system provides 10% relative humidity in the lyophilisation area for the extreme dryness required there. The third is the all-over comfort conditioning which ensures relative humidity of 50% and temperature of 70°F, throughout the rest of the building.

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Each laboratory has three different voltages of electric current—110, 220 and 440; hot, cold and de-ionised water; low and high pressure steam; vacuum and compressed air facilities. Fluorescent lighting is mostly recessed to minimise the risk of dust accumulation on fixtures from dropping into the working area.

Machines and equipment are evaluated and tested in an 800 sq. ft. pilot plant which is part of the new building. This information is used to guide the company when new machinery and equipment are bought.

#### Work of laboratories

The work of the laboratories can be classified under four headings: I. Developing the most useful forms of issue for new drugs and drug products. 2. Preparing and testing the drugs to be used in the clinical trials preceding the product's introduction. 3. Assisting the production department in setting up the procedures for full-scale manufacture. 4. Testing of dosage forms of pharmaceutical products for stability and convenient usage.

In the tablet coating laboratory tablets are coated in pans varying in size from 42 in. in diameter to as little as 4 in. As many as 80 coats may be applied to some batches over a period of four days. One of each pair of ducts leading to the pans dries the tablets by blowing hot or cool air on to them as they revolve. The second duct sucks up dust. A thermostat controls temperatures of air blown on to the tablets.

A Manesty DryCota machine is used in the new process of dry



This laboratory is used for the formulation of products and for stability studies. Operator is adjusting water flow to cool reflux condenser in foreground. Chrome fittings on panel regulate such services as hot, cold and de-ionised water, steam, high vacuum, ordinary vacuum, nitrogen, natural gas, compressed air and electrical connections.



Calipers are used to check thickness of tablet that has been coated by dry compression in Manesty DryCota machine shown here. Core of tablets is compressed in turret at left, then transferred mechanically to turret on right where they are dry coated by compression. The improved machine made it possible for Ciba to develop Pyribenzamine Lontab, an anti-histamine tablet that gives sustained relief to allergy sufferers for periods of up to 12 hr. Dry coating made it possible to put medication in the coating as well as in the core. This is not possible in the wet coating process.

coating tablets. In one turret of the machine the cores of the tablets are compressed and then transferred mechanically to another turret where they are dry coated by compression. Finished tablets slide down a vibrator chute which removes excess powder. A feature of this machine is the control system developed jointly by Ciba and Manesty which ensures that each tablet will have a core. The dry coating process makes it possible to put medication in the coating as well as in the core. Calipers are used to check the thickness of the tablets after dry coating.

#### Stability tests

In the stability area drugs are stored in a cabinet which reproduces accelerated lighting conditions: this enables research workers to determine after a month's time the effect of ordinary store lighting on products kept on chemists shelves for 20 months. In this area tests are also done under all climatic conditions. Colour stability experiments are conducted in precision controlled temperatures This determines the length of time drugs can be used in pharmaceutical preparations without fading.

A machine which washes, fills and seals ampoules in pairs has a capacity of 6,000 ampoules per hr. They are lined up on revolving drums and fed into two flushing and two filling stations. A chain feed carries filled ampoules to four sealing stations, where, after flame sealing, they are carried off to the chain feed. Flow meters feed oxygen and air to sealing stations and nitrogen to the station where ampoules containing oxygensensitive materials are flushed.

#### Aseptic area

An aseptic area is provided for the production of drugs under sterile conditions. Walls are ceramic tiled except in the central aseptic laboratory which has smooth plaster walls. During aseptic operations actual exposure of the product takes place in specially designed aseptic hoods.

This new building is the only one of Ciba's eight divisions responsible for a product from its inception to its final appearance. Other research divisions include chemical macrobiology, microbiology, developmental research, clinical investigation, quality control, analytical research and pharmacy research and development.

Colour stability experiment at Ciba's new laboratories. The cabinet in which flasks containing drugs are suspended maintains a constant, precision-controlled temperature of 40°C. This determines how long the drug can be used in pharmaceutical preparations without fading. On top of the cabinet, at left, is the stirring mechanism to assure constant circulation of water in the bath. Flask at upper right maintains constant water level.



# Plant Protection's New Laboratories

THE new laboratory block at the Yalding (Kent) works of Plant Protection Ltd. replaces the original laboratories, which were built some 25 years ago. An unusual feature is the toxic laboratory which is described later.

Extensions to the original laboratories proved inadequate to deal with increasing work and the greater number of technical staff involved. The necessary facilities have now been provided in the new three-storey building with an area of approximately 11,000 sq. ft., which was completed in February last.

The new laboratories form part of the chemical group of the Technical Department of Plant Protection Ltd. (the biological group is at Fernhurst Research Station). The work of the chemical group can be divided into three main sections—analytical, formulation and intelligence.

The most important work of the analytical section is the control of the quality of the company's crop protection products and of the material used in their manufacture; and the analysis of materials and finished products sent in by associated companies and agents overseas.

An important and growing aspect of analytical work is the determination of residues of crop protection chemicals on crops at time of harvest. Approval schemes and regulations in this and other countries make it necessary for manufacturers to provide analytical information about the magnitude of the residues; these have to be correlated with the toxicity of the chemicals used.

The formulation section is divided into four sub-sections dealing with the chemistry of weedkillers, insecticides, fungicides and seed dressings. A considerable amount of clerical work is involved: it is essentially technical service work, concerned with advice to overseas companies and agents, the quality of supplies, and liaison with the biologists at Plant Protection's Fernhurst Research Station and with the company's commercial sections. The laboratory work is concerned primarily with physical chemistry.

The section is also responsible for the development stages of all new products, including (in conjunction with the company's packaging adviser) their packaging; for the latter purpose, rooms with controlled temperature and humidity have been provided, to simulate the wide range of climatic conditions met with in various parts of the world. The three constant temperature rooms run at 25°C., 75% relative humidity; 37°C.,

90% relative humidity; and 50°C. dry heat; refrigerators run at varying temperatures down to -30°C.

### Toxic laboratory

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This laboratory is on the third floor at the end of the building. This location was chosen to minimise the risk of toxic fumes entering other laboratories.

Like the other six laboratories, it measures 14 ft. imes 29 ft. It has two peninsula benches of 9 ft. ×2 ft. 3 in. and a fume cupboard with the same bench dimensions. The bench tops, including that in the fume cupboard, are of well-oiled teak 11/4 in. thick. The floor slopes to gullies at the side and is made of acid-resisting terrazzo. (Floors elsewhere are made of thermo-plastic tiles.) This is to enable the whole laboratory to be completely washed down. cold-water shower is fitted for All effluents personal first-aid. from the laboratory go to a pair of diluting tanks made of pressed



One of the seven new laboratories at Yalding, showing standard arrangement of benches.

Chemist working in the toxic laboratory wears a plastic suit fed with slight positive airpressure. The bench can be converted into a fume cupboard by closing the PVC curtains.

galvanised steel and measuring 8 ft. ×4 ft.; here they are treated before going to the main drainage.

The most unusual feature of the laboratory is an arrangement by which each of the two benches can be provided with fume cupboard facilities. Above each bench is a canopy with nylon runners from which are suspended curtains made of 0.006 in. PVC. These curtains are weighted and provided with three 18 in. overlaps. Directly above each bench are three exhausts through which fumes and particles are drawn out by fans coated with chlorinated rubber for corrosionprotection. The ducting and manifold are made of asbestos cement coated with acid-resisting bitumen.

The plastic screens are obviously cheaper than standard fume cupboards. Furthermore they make the benches easily accessible all round, and, of course, they enable the benches to be used normally when fume extraction is not required. They are experimental and if they prove satisfactory they will no doubt be adopted elsewhere.

Complete plastic chemical-resistant suits, fed under a slight positive pressure with fresh air, are available in this laboratory for use in exceptional circumstances. These precautions are taken to safeguard the health of chemists and their assistants.

#### LABORATORY FURNITURE

Metal. The traditional material for laboratory furniture is wood, but metal laboratory furniture, while competitive in price, has advantages in the simplification of laboratory planning, ease of installation and flexibility of use arising from the unit construction. For overseas markets, particularly where there is little skilled labour for erection and where the climate is unsuitable for furniture constructed in timber, metal furniture is usually preferable.

Baird and Tatlock (London) Ltd. manufacture furniture and fittings in metal or timber, with all auxiliary fittings and service lines.

B.T.L. metal unit laboratory furniture is based on the use of cantileverform steel bench standards to carry the bench top and services, providing a rigid working surface whether or not under-bench units are fitted. Underbench units, selected as required from the standard B.T.L. range, are placed under the bench top in the desired position and locked in place by a simple levelling device incorporated in the unit. Units can be located without reference to the positions of bench standards and can be rearranged as desired. Services can be built up from B.T.L. prefabricated plumbing units. The company point out that an advantage of this system of unit construction for laboratories overseas is that the units, bench standards and accessories can be exported from this country and, if suitable local timber and labour are available, such timber accessories as bench tops can be made locally.

B.T.L. convertible laboratory equipment earries the flexibility of the B.T.L. metal unit system to an even higher degree. The basic component of the equipment is the service unit, carrying a wide range of services. To this unit are fitted removable working bench tops, adjustable from standing to sitting heights, and in a range of standard widths and materials. Compound under-bench units, developed from B.T.L. metal laboratory units, are so designed that they can be used at either standing or sitting heights, and a similar range of compound units is

available in timber.

Wood, A. Gallenkamp and Co. Ltd. have been making unit laboratory furniture for 25 years. Selected woods are blended with modern designs in their recently introduced "500" range.

The drawing illustrates the six basic applications of this equipment. Method A is the most simple and the The bench top is least expensive. The bench top is mounted directly on to the carcase units which can be re-arranged with reasonable facility if the laboratory has to be altered, but benches so

assembled are best regarded as a fixture. Cupboard units used in this way have removable backs to give access to the services behind. Type A benches are 3 ft. high and are generally suitable for industrial, college and university teaching laboratories where a high degree of mobility is not essential. Type B benches are identical in form but only 2 ft. 9 in. or 2 ft. 10 in. high, which makes them particularly suitable for school, and some hospital, requirements.

In methods C and D the bench top is mounted on timber cantilever arm units designed so that the front of the bench is not obstructed by legs. Carcase units can be moved freely beneath the bench top or removed or interchanged to suit the work in hand. Both types C and D benches are 3 ft. high, but D offers the superimposed service housing at the rear preferred by many users. Although these two methods are initially more expensive than type A, they are valuable where a degree of flexibility is essential. In consequence they are of particular use in research, radio-chemical, physical and some hospital laboratories.

A type E bench, provided with a continuous top at 3 ft., or any other height to meet special needs, is ranged in front of an entirely independent service unit. The whole of the working bench, including the top, can be removed to give complete access to the plumbing and services. Method F is the same except that the bench, 3 ft. high, is made up from units each having a separate working top. They are

bolted together by a simple device and the tops are made continuous, with rubber-sealed joints between modules.

The module widths of the carease units are 1 ft. 6 in., 3 ft. and 3 ft. 6 in. and the range includes cupboard and drawer, waste box and sink assemblies. In addition to these there are drying cupboard, refrigerator and incubator units, and also sectionalised storage cupboards and a complete range of bottle shelves, storage racks, desks and ancillary equipment. The carcases are made from hardboard and veneered blockboard and exteriors are of oak, light polished with flush fitting handles to both drawers and doors. Toe-space rails are of mahogany.

Working tops are made from Moulmein teak, Iroko, asbestolite, chemical lead, black technoplate (toughened glass), formica, P.V.C. or polythene. Fume cupboards in the "500"

range vary from the simple hood to the most comprehensively equipped multiple assembly. They are framed from oak, teak or mahogany and lined with asbestolite with technoplate or asbestolite bases. It is claimed by Gallenkamp that interiors are highly resistant to corrosion and maintain their appearance in the face of arduous conditions, as materials are selected to resist known hazards. A water-cooled baffle assembly is available to safely evacuate perchloric acid fumes and all cupboards can be fitted with baffles which facilitate even extraction over the entire front aperture when the sash is fully raised. In laboratories which have air conditioning, cupboards can be provided with raw air intake ducts



B.T.L. metal unit furniture installed in the main sterile products laboratory of the Group Pharmaceutical Unit, St. James's Hospital, Leeds.

which greatly reduce the amount of conditioned air which is extracted through them. A wide range of specially designed exhaust fans and asbestolite and F.V.C. trunking, applied to meet individual requirements, is offered in association with these fume cupboards and hoods.

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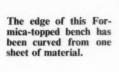
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A comprehensive selection of newly designed service taps and sinks, together with polythene, vulcanite and stoneware waste fittings, gas generating, air and vacuum plant, are all available from the company.

TYPES A&B TYPE C TYPE D TYPES E & F

Six basic applications of the "500" range of wooden laboratory furniture made by A. Gallenkamp and Co. Ltd. The different arrangements are explained on the opposite page under "wood furniture."





Decorative laminates. In recent years decorative laminates have been used as a constructional material in many laboratories. True phenolic laminates are solid homogeneous boards, built up of several layers of resin impregnated core sheets, a coloured pattern sheet, and over all, an impregnated sheet, which becomes transparent during the curing process by which the various layers are fused by heat and high pressure into one. It is the particular resins used in this top sheet which give to laminates such as Formica, their resistance to abrasion, and which combine with the sturdy core to produce a very high impact strength. Formica Ltd. claim that little short of a really heavy blow or extreme abrasive wear will affect their

Unlike most other known materials, say the makers, decorative laminates do not deteriorate with age (in fact, owing to the gradual curing of the resins they actually improve) and unless they are subjected to violent abuse they will show no mark at all. They will not fade, chip, crack or craze.

Decorative laminates are easy to keep clean. Spilt liquid, chemicals, grease and dirt can in most cases be removed from their surfaces with a damp cloth and some warm water. The makers of Formica claim that their material is chemically inert and completely nonporous. It is unaffected by such widely different chemicals as ethyl alcohol, carbon disulphide, chloroform and carbolic acid (10% and 5%). Alkalis and most acids in normal or strong solution will not harm it, and although a few of the mineral acids such as sulphuric or hydrofluoric will in concentrations attack it, no damage will be done if they are wiped off fairly quickly. It is claimed that Formica withstand directly applied

temperatures up to 310°F. and will not support combustion. Laminates, however, are in general poor conductors of electricity and should be used with caution where there is a risk from static charges.

They are stated to be excellent materials for wall panelling in corridors, dispensaries and laboratories for bench tops and fronts and work tables. They are available in a very wide range of colours and finishes—plain colours, linen finishes and woodgrains, to name but a few—and their bright clean appearance has an important psychological value.

A recent introduction is the "post-forming" grade of Formica material. This is a 1½ in. veneer identical in appearance and properties to the standard grade of Formica, but can be formed to 1½ in. radius curves by pressing, after it has been evenly heated 325°F. Although more versatile than the standard grade, this laminate is reported to be as tough and durable, will withstand the same knocks and hard wear and possesses a similar high degree of chemical resistance.

#### **OVENS AND FURNACES**

High temperature electric furnaces and control units. Johnson Matthey, besides producing laboratory furnaces to customers' particular requirements, have recently set up a new standard range of platinum-wound electrical resistance furnaces, having maximum operating temperatures ranging from 1,350°C. to 1,775°C.

General-purpose furnaces. The K-type general-purpose furnaces are of completely new design, the A series being for use up to 1,350°C. and the B series for use up to 1,500°C. Types K25 and K26 are identical except that the diameter of the combustion chamber

is 11 in. in the former and 11 in. in the latter. Consequently the K26 series has a slightly higher power rating.

The windings are of 10% rhodiumplatinum, totally embedded in high alumina refractory, and the elements themselves are fitted inside heatresisting cartridges which are mounted in light alloy casings finished in two-tone stove enamel. Each furnace is supplied with two platinum: 13% rhodium-platinum thermocouples, for connection to the thermo-indicator, over-temperature device, if fitted, and to the proportional controller, where fully automatic control is required. During operation the outside temperature of the casing remains so low that the furnaces may be operated safely on a wooden work bench. Construction is such that both elements and thermocouples are easily replaceable.

Types K44 and K45 are the newest in the JMC range and are similar in appearance and construction to the K25 and K26 types, although larger in external dimensions. The K44 series has a combustion chamber 2 in. in dia. and the K45 a chamber 21 in. in dia. and the A and B series again represent max. temperatures of 1,350°C. and 1,500°C. respectively. The zone of uniform temperature in the K range of furnaces is stated to be exceptionally large in relation to the size of the

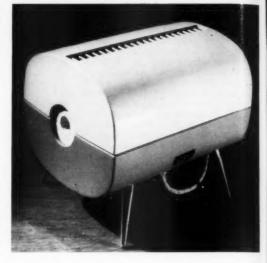
chamber.

Control units. The C4 series of units are said by the makers to be the most advanced of the standard range of control equipment for JMC platinumwound furnaces. Each of the series incorporates a proportional controller. Types C4C and C4D have a programme controller, and types C4B and C4D have an auto-transformer for use if the furnace is wound for a voltage other than that of the mains supply.

The C8 series are of entirely new design and represent the simplest form of control equipment in the JMC range, replacing the obsolescent C5 series. A thermo-indicator and a Sunvic energy regulator, which is used both to control the initial heating rate of the furnace and to maintain the required temperature, are incorporated in all units. C8C and C8D are fitted with an over-temperature protection device.

Wide range oven. The Baird and Tatlock wide range oven, with fan, besides achieving the performance required by B.S. 2648, can, it is stated, be used over a range of 30°C. to 200°C. both for static operation (with or without convected air flow) and for normal circulating or forced draught conditions with the fan operating. The oven is also available without a fan. The air vent can be adjusted from no flow to fullbore venting, when an air change of over 1,500 litres/hr. is possible; vent conditions are accurately reproducible.

The K25 general-purpose furnace can be used up to 1.350°C. It is one of the latest Johnson Matthey range, being platinumwound and electrical resistant.



Temperature range of this Gallenkamp oven is up to 200°C, which is reached within 65 min. from room temperature.



The four identical heaters are connected in pairs, forming two heater circuits which are arranged to operate at different temperatures; temperature differential is normally preset to about 15°C., but may be adjusted if, for example, it is necessary to run the oven at the bottom of its range. With this arrangement both heater circuits come into operation when the chamber temperature drops appreciably below the required temperature, giving rapid warm-up from ambient and rapid recovery after the oven door has been opened, but the auxiliary heater circuit cuts out at 15°C. below the required chamber temperature, thus minimising overshoot. Pilot lights indicate the operation of the heater circuits.

Special care has been devoted to the insulation of the heater box containing the heaters and the stainless steel chamber. In addition, the oven is fitted with a doubly insulated door with a stainless steel door back which seals in the chamber by means of an

interwoven asbestos gasket.

Ovens and incubators. range of ovens (to British Standard 2648) and incubators is being supplied by A. Gallenkamp and Co. Ltd.

The temperature range of the ovens is up to 200°C., which is reached within 65 min. from room temperature. At 100°C. the temperature variation between any two points in the working space does not exceed + 2.5°C., while the fluctuation at any single point is not more than 0.25°C. The incubators are designed to have a maximum working temperature of 100°C.

In order to satisfy exacting standards it was necessary to design and manufacture a special hydraulic thermostat known as the Compenstat. This control unit has unique advantages and is available only in Gallenkamp equipment and apparatus. The firm claims the following advantages of the Compenstat over other types of

temperature controllers:

(a) Snap-action contacts can be used.

(b) These contacts cause negligible television and radio interference.

Temperature setting is not affected by wear of contacts, which in any case is negligible on the Compenstat.

Temperature setting is not affected by changes in barometric pressure.

Temperature setting is not affected by changes in external temperature (control-head temperature).

(f) No relay is required in the control circuit, thus eliminating a possible source of breakdown.

Both the ovens and incubators are made in three sizes, and the ovens may be obtained with or without The liner, mechanical convection. door box, shelves and supports are made in a smooth finish stainless steel.

#### APPARATUS AND EQUIPMENT

Glove cabinets. Rigid and flexible glove cabinets have become important in laboratories handling particularly noxious materials whether these are noxious chemically or radiologically.

Townson and Mercer's flexible glove cabinet, although designed as a standardised unit, can, quite cheaply, be built up to special sizes, with as many glove ports as may be required, and with these in any position. A further advantage claimed is that owing to the ease of manufacturing special shapes, it can be made up as part of a laboratory assembly, surrounding a piece of special large apparatus, or even a machine tool, e.g. a lathe, milling machine, etc.

It is relatively cheap, and if heavily contaminated can be folded up into a small space and stored for a period for decay, in the case of radioactivity. It is used either under slight pressure with an inert gas where it is required to prevent objects inside from becoming contaminated with dust, bacteria, etc., or alternatively it can have a thin steel framework to maintain its shape and can then be used under slight negative pressure for noxious chemicals, etc. It is, of course, ideal for handling articles in an inert atmosphere.

For serious continuous work with radioactive materials there is the true rigid glove cabinet.

They are normally listed in two sizes, but again extra glove ports can be fitted in the top or sides as required and they are sent out with a guaranteed leak rate, which, state the designers, is exceptionally low. They are intended to operate with Townson and Mercer's standardised extraction and radioactive filtering unit, and are stated to be completely suitable for continuous use with dangerous radioactivity. Special sizes and shapes can be built, but owing to the work involved in filling all the joints with special resistant resin, it can become rather expensive to make in very strange shapes.

They are intended to operate with the standard long rubber gloves as developed by the Atomic Energy Authority, and these are easily fitted and discarded for decontamination if

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Apart from these two specific pieces of apparatus which are claimed to give practically 100% safety, the classical fume chamber has also been improved over the years, and is now normally supplied as a standardised unit in a size of 2 ft. 8 in. wide, 2 ft. back to front, 3 ft. 3 in. high max.

One noteworthy improvement in this design has been the use of a frameless armoured front glass. This slides



Glove cabinet by Townson and Mercer Ltd.

directly in the wooden uprights, and obviates the sticking encountered in older types, when a wood framed glass had to slide in wooden uprights.

These fume chambers can be supplied as standard, with sinks and taps, according to preference, and can be connected to any normal extraction system.

Glassware. The latest addition to the Quickfit range is a set of open-necked reaction flasks and lids from 700 ml. to 20,000 ml. capacity. Lids and flasks are all fully interchangeable. The small flask of 700 ml. capacity, when fitted with a five-necked lid, provides a versatile unit which will carry a thermometer pocket dipping into the bottom of the liquid, a stirrer, gas inlet



Laboratory glassware is washed in just over 3 minutes in this machine made by Dawson Bros.

tube, reflux condenser and dropping funnel. By the addition of a stillhead the assembly can rapidly be arranged for a distillation process. The larger neck permits easy cleaning of the flask, allows larger stirrer blades to be accommodated, such as anchor stirrers, and ensures that under all reaction conditions a flask can always be detached from its lid even at high temperatures with resinous materials or under other conditions, when large conical glass joints tend to seize.

At the other end of the scale the 20 litre unit is of sufficient size to be valuable for small-scale batch production work, and a complete range of stillheads, condensers and receiving equipment is available to go with this equipment. Notwithstanding the comparative large size of the apparatus, it does not require specialised supporting structure. If necessary it can be used with laboratory stands and clamps.

The stirrer used for this reaction vessel is of novel design of all-glass construction incorporating a precision ground sleeve arrangement. It is reported to be equally suitable for operations at atmospheric or reduced pressures. Since this is a gland as distinct from a stirrer, it can be used with all existing Quickfit stirrers and stirrer guides, and is not limited to its application with open-necked flasks.

Glassware washer. The Dawson Laboratory glassware washing machine washes all kinds and shapes of laboratory glassware. The soiled containers are given a 3 min. jetted detergent wash (145° to 160°F.) followed by a 15 sec. jetted cold water rinse, but treatment times can be varied to suit individual conditions. These jets are so arranged that every part, inside and outside, of every piece of glassware is thoroughly cleaned.

The detergent in the machine is recirculated during the washing operation by means of a motorised pump. It returns to the tank and is pumped back through the jets via a pipeline filter, which prevents the jets from clogging and ensures that the detergent is always clean. The rinse water comes straight from the mains.

Operation is simple. The soiled glassware is placed in a special rack, the rack is inserted into the treatment chamber on guide rails and the counterbalanced door is lowered. The guide rails ensure that the articles are acurately aligned over and under the interpolation.

With the control lever in the wash position the starter button for the washis depressed. An indicator light which glows for the duration of wash goes out when the wash is automatically switched off after 3 min. The rinse is controlled in the same way. The lever is moved to the rinse position and the

rinse button pressed. At the end of 15 sec. the rinse ceases, the light goes out and the glassware is ready to be removed.

The wash water can be heated by gas, steam or electricity. A stainless steel finish facilitates cleaning and helps to ensure hygiene. The counterbalanced door is fitted with a window, and a light illuminating the interior enables the cleaning process to be witnessed.

Bunsen burner. The increased use being made, both in this country and abroad, of propane/butane, methane/natural gas and sludge gas in laboratories where town gas supplies are not readily available has prompted Amal Ltd. to market an addition to their range of bunsen burners, the new 3 Jet Maximus model.

This equipment gives a carpet of small blue cones over the surface of the burner head, the area of which is sufficient for the heat to be distributed evenly under large-diameter flasks. It has been designed to permit the passage of the greater volume of primary air required with these high calorific value gases to give the same heat output as a smaller standard town gas burner; for example, the new burner liberates something over 3,000 Kg. Cal. per hr. at normal gas pressures.

A finger-controlled needle valve in the gas supply line in combination with the grid burner head allows great flexibility in pressure control with good turn down, and the use of the three precision jets also contributes to the "carpet" flame characteristic. Cooling fins are provided on the air tube stem which is mounted on a solid base fitted with a non-tip handle, for the purpose of dissipating the reflected heat.

The Amal 3 Jet Maximus is 7½ in. high with a head diameter of 2½ in.; it has been tested and approved at both the Shell and Calor Gas laboratories.

Test sieve. An electric test sieve is a Sturtevant development. The vibrating mechanism is controlled by a time switch to operate any time from one minute to an hour. At the end of the set period the timing gear comes into operation and cuts off the switch, the sieves then contain their respective grading and any tests made will be comparable if carried out on the same time basis. The sieves can be easily changed, and besides the receiving pans seven sieves can be used at once.

Reducing and grading. Sturtevant Engineering Co. Ltd. manufacture laboratory machinery for reducing and grading of almost every material.

A ball mill which can run on 1 h.p. grinds hard materials such as ores, chemicals and fireclay. For a reasonable output the mill will reduce 2 in lumps down to 30 or 40 mesh in one



Leonard thermostatic steam and water mixer.

operation without auxiliary machinery, as it is entirely self-contained and effects its own screening. No special foundations are required. The grinding plates are of hard steel and the balls of special carbon steel. The screens can be easily removed and choking of the mill is prevented by an automatic device controlling the feed. Side and end plates are hinged to give easy access to the interior.

Materials such as gum arabic, sulphate of ammonia and soap flakes are dealt with by the hammer mill. It will reduce all but the very hardest substances from approximately 3 in. cube to 20 mesh and finer according to the friability of the material. Hammers



The Amal range of bunsen burners includes this "3 Jet Maximus" model for use in laboratories which do not have easy access to town gas supplies.

swinging freely on pins are held out by centrifugal force and crush the material until it is fine enough to pass through the grate bars at the bottom of the casing. Should any unbreakable objects get into the mill the hammers being pivoted swing back, pass over the obstruction and fly out again.

The Sturtevant Unicam mill is a selfcontained unit complete with a separating system operating on a closed circuit which is under suction, so preventing any leakage of dust. It is reported to be able to reduce most soft or medium hard material to a micron size without the use of an external source of energy such as steam or compressed air, or the need for screens at any stage of the operation. The air separator system allows exact regulation to a predetermined size of the finished product. The coarse product may be delivered externally from the separator instead of returning to the mill, so that two products of different size are obtained at the same time.

Water bath and shaking incubator. This is a general purpose water bath of advanced design, featuring control by the new Gallenkamp Compenstat, stainless steel construction and a large unobstructed working space. The motor-driven shaking rack is available as an accessory for experimental and routine investigations requiring agitation in conditions of controlled temperature and, where necessary, controlled atmosphere.

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Thermostatic mixing of warm water. Walker, Crosweller and Co. Ltd. have added type TS. 202 to their largecapacity mixing valves. This valve can be used for mixing either hot and cold water or steam and water. Its working principle is very simple. According to the temperature of the water in the mixing chamber, a bimetallic coil winds or unwinds, and in so doing opens or closes the ports in the valve admitting hot and cold water, or steam and water. This, say the makers, ensures automatic control of temperature and cuts out guesswork.

Thermostatic mixing valves are being used for photographic purposes (colour, and black and white). certain chemical processes closeness of temperature control is the prime feature in determining success or failure, and often the responsibility for achieving it rests with the plant operator, who has other duties to perform. Walker, Crosweller claim that thermostatic mixing valves remove this onus from the operator, making the heating automatic. In addition to the temperature control they cut the fuel cost and economise the consumption of water. They mix water at any temperature pre-set by the turn of a regulating handle



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Left: Checks on industrial humidity controllers can be made by electronic hygrometers such as this one made by the Shaw group.

Right: Evershed and Vignoles have designed the Tinsley polarograph with additional refinements on the basic circuit to simplify operation.

Left: Molecular weights of organic solids and liquids can be determined by this Gallenkamp ebulliometer, which measures the elevation of the boiling-point of a solvent on the addition of a solute.



#### INSTRUMENTS

Hygrometer. The Shaw electronic hygrometer is said to have an immediate response, stable characteristics and provision for easy checking and standardising, as well as remote reading.

The small detecting element consists of a capacitor with a hygroscopic dielectric, only a few microns thick, with a 24 carat gold electrode. A detector is contained in a small, fine wire gauze protector, which plugs into a coaxial cable connecting it to the recorder. The detecting element is 1 cm. in diameter and 6 cm. long, and can be used with any length of cable.

These hygrometers have been used as standard instruments by which checks are made on industrial relative humidity controllers, such as are fitted in many factories.

Another use is for quick estimation of moisture in hygroscopic materials. The detector is simply placed in the material to be tested, and after a few seconds, when the pointer is steady, the moving coil meter indicates the moisture of the material on the easily read scale.

Semimicro ebulliometer. Designed by Gallenkamp in co-operation with Mr. C. Heitler of Northampton College of Advanced Technology, London, for rapid and accurate determinations of molecular weights of organic solids and liquids, this ebulliometer accurately measures the elevation of the boiling-point of a solvent on the addition of a solute. Previous limitations of ebulliometric methods are overcome

by the novel design of the boiling chamber and the use of a thermistor sensing element of low thermal capacity.

Known weights of the compound under examination, in either tablet or liquid form are added to the solvent contained in the ebulliometer chamber, and the changes of resistance of the thermistor measured. The system reaches equilibrium in less than three min.; accuracy to  $\pm$  2% with 50 mg, to  $\pm$  0.8% with 200 mg, compound. Ref.: Heitler, C., Chemistry and Industry, 1952, 875.

I-R equipment. A grating accessory, consisting of a second monochromator using two gratings (1,500 and 3,000 lines/in.), is available for use with the rock-salt prism monochromator of the basic SP.100 infra-red spectrometer to form a double monochromator with high resolution and low stray light, and providing double beam spectra on a linear wavenumber scale over the ranges 650-2150 cm-1 and 2150-3650 cm. 1. Made by Unicam Instruments Ltd., it incorporates the necessary wavenumber cams and automatic grating interchange mechanism. Arrangements are also made for work outside the double monochromator range.

The development of the type of replica grating which is used in this accessory permits resolving powers to be attained in the near infrared region, which are appreciably better than for conventional prism materials (LiF, Ca F<sub>2</sub>, Na Cl). In this way, say Unicam,

the high resolutions made possible will meet the most exacting demands of research workers, and the accessory is expected to attract wide interest.

Polarograph. Polarography is essentially simple. It consists in making a suitable solution of the material to be analysed, and electrolysing it between two mercury electrodes. The anode is a pool of mercury and the cathode a series of mercury drops which emerge from a capillary dipping into the solution. A continuously increasing negative potential is applied to the cathode, and the change in current with voltage is noted; the rise in current at a particular voltage being the measure of the concentration of the species, and the voltage indicating the nature of ion or radical being determined. Such a current/voltage graph is called a polarogram, and the rise in current a polarographic step.

Evershed and Vignoles have designed the Tinsley polarograph with additional refinements on the basic circuit for ease of operation. The small current from the cell is amplified and fed to a pen recorder or indicator, ancillary circuits cancel out extraneous currents due to minute traces of impurities in the chemicals used in the analysis, zero adjustment is provided which enables determinations of elements present in the ratio of 50:1 to be made on the same solution simultaneously. The motor-driven potentiometer is fitted with a two-speed gear box so that adjacent steps may be more easily resolved, and to allow for slow reactions such as occur in some biological applications. As it may not

always be possible to measure two steps which are in close proximity a simple switch change over enables the operator to obtain the first derivative of the normal polarogram, this has two effective time constants so that steps which are within 40 mv of each other

may be resolved.

Five degrees of damping are available, so that the pen or indicator needle excursions may be minimised for rapid routine analysis. However, a position of zero damping is provided in which the true current occurring during the life of each individual drop can be measured. This is required sometimes when the instrument is used in the investigation of electrokinetic processes. The complete instruments are housed in tropicalised wooden cases, which are claimed to be unaffected by industrial laboratory atmospheres.

Automatic titrator. Although the fully automatic laboratory is some way off, the use of the Pye automatic titrator in combination with a direct reading pH meter/millivoltmeter is claimed to offer automation where routine titrations are involved. In the illustration the pH measuring electrode system feeds the pH meter (right) which at all times indicates the pH value. This in turn drives the automatic titrator (left) previously set up so that it shuts off the flow of reagent from the burette by means of the delivery unit. In order to add the majority of the burette solution at the maximum rate, an additional circuit in the titrator switches from fast to slow rate of addition at a predetermined distance from the end-point.

This combination can be used to maintain solution pH at any given value (e.g. while a reaction proceeds) and can be employed whenever samples have to be adjusted to a certain pH

value.

SP. 900 flame spectrophotometer. The Unicam flame spectrophotometer consists of a burner (for propane or acetylene) fed with an air supply (conveniently derived from a small compressor) in which the sample material has been finely dispersed by means of a concentric jet atomiser.

Light from the burner, which shows a high degree of stability, is passed through a silica prism monochromator of high light-gathering power and on to a detector (photomultiplier or photocell) via a 100 c/s chopper. The detector output is amplified and synchronously rectified, and the resulting signal displayed as a direct reading of emission line intensity on a spot galvanometer which has an open scale and high speed of response. An alternative signal outlet suitable for operating standard types of selfbalancing potentiometric recorder is



An automatic titration in progress featuring the Pye automatic titrator and the master pH meter.

also provided. The instrument is constructed with the monochromator in an upper compartment and electronics below, the atomiser and flame controls being in a separate compartment at one end. Power supply and compressor, if used, are external. All controls and the sample input are on the front panel, and the burner at the rear.

The power range and versatility of this new instrument, as well as its simplicity of operation, make it suitable for a wide variety of industrial uses, both for routine quality control and a research.

Potentiometric microtitration apparatus. For the determination of chlorides in plasma, serum, cerebrospinal fluid, etc., and other titrations, this apparatus was designed by Gallenkamp and Co. Ltd., in co-operation with Dr. I. D. P. Wootton, Postgraduate Medical School of London.

With it the chloride content of as little as 5 ml. of solution may be determined. Titration is carried out against a standard silver nitrate solution, and the method is particularly suitable for use with blood plasma, serum, cerebro-spinal fluid, etc., where only small volumes of sample may be available

The silver-platinum electrode system is built into the jet of a short 5 ml. burette, and the contents of the 10 ml. beaker, in which titration is carried out, are stirred magnetically. The end point of the titration is indicated by a valve millivoltmeter which incorporates a suspension type galvanometer for absolute accuracy. electronic circuit of this meter is fully stabilised and the galvanometer has a very short period and is of rugged design.

In operation, with periodic checks of the end point made against a standard chloride solution, it is only necessary to run in titrant to a predetermined reading of the galvanometer, at which point titration is

complete.

Polarimeter. Ericsson Telephones Ltd. manufacture the automatic polarimeter type 143A which is based on an original design by the National Physical Laboratory. It is an electronicallycontrolled instrument the output from which can be fed into a recording device. It has particularly wide applications in industries where a large number of routine measurements are made daily. Because it is more sensitive than visual polarimeters, much shorter sample cell lengths can be used without sacrificing relative precision.

The use of short sample cells permits the measurement of solutions which can only with difficulty be measured in visually balanced polarimeters owing to absorption. This is because in any solution the angular rotation falls linearly with decreasing path length, whereas the absorption will usually fall exponentially. The basic range of the instrument is  $\pm 0.5^{\circ}$  of angular rotation with an ultimate precision of the order of  $\pm$  0.0002°. By suitably off-setting the zero, the instrument can examine angular rotations within its range of ± 0.5° anywhere in the range 0-360°.

It operates on the Faraday effect, which is the rotation of the plane of polarisation of a beam passing through a transparent material in a solenoid. The rotation so produced is directly proportional to the magnetic field, and hence to the current in the solenoid.

The automatic polarimeter makes use of two such solenoids, a modulator and a compensator Faraday cell. The modulator is arranged to oscillate the

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plane of polarisation of a beam through a small angle at a frequency f. In the absence of a sample, and with the polarisers crossed, the intensity of the beam, which is sensed by a photomultiplier, will not contain components at a frequency f, but of 2f.

If, however, a sample is present, the intensity of the beam will vary, containing frequency components at both f and 2f. The photo-multiplier output, proportional to the intensity of the beam, is amplified and frequency com-

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ponents differing from f are suppressed. Components at f are then detected in synchronism with the current at f in the modulator Faraday cell, and fed back as direct current to the compensator Faraday cell.

The compensator Faraday cell is thus energised with a current automatically adjusted to compensate for optical rotations of the sample. This current, suitably displayed, corresponds to the rotation produced by the sample.

Demineralised water is produced by Permutit's Mark V portable "Deminrolit" plant.

#### WATER TREATMENT

Portable demineralising plants. The modern Permutit's *Deminrolit* system, which uses neither heat nor power, produces demineralised water free from dissolved solids at a fraction of the cost of distillation.

Plastics, metallurgy, chemicals, electronics and boiler feeding are typical applications where demineralised water is extensively employed; these *Deminrolit* plants range in size from large fixed installations to the small portable units which have proved successful in laboratories, research establishments and test houses, and for many industrial purposes where only a small

amount of demineralised water is required.

The portable Deminrolit converts clean, cold piped water into demineralised water by ion exchange. A pair of small sealed cylinders contain the granular ion exchange resins, and a multivalve control is used for directing the water through these cylinders in series. The first cylinder contains "Zeo-karb" hydrogen ion exchange material, which replaces cations in the water by hydrogen ions; the salts in the water are thus converted to the corresponding acids. This acid water then passes through the "De-acidite' material contained in the second cylinder; the acids are thereby absorbed, and treated water is produced which contains only minute traces of the salts originally present in the raw supply.

After the rated output of water has been demineralised, the ion exchange materials require regeneration. This is done by flushing the "Zeo-karb" cylinder with dilute hydrochloric acid and the "De-acidite" with sodium carbonate or caustic soda: the Deminrolit plant is then ready for producing another batch of demineralised water.

Output per regeneration varies approximately in inverse proportion to the quantity of soluble salts present in the raw water. When treating "thin " waters, i,e., those containing only a small quantity of dissolved solids, a greater output per regeneration is thus obtained than with water more heavily charged with dissolved solids. show when regeneration is required, an electrical conductivity tester is provided. The electrical conductivity of water varies with the dissolved solids present. A measure of the conductivity thus gives a reliable indication of the amount of solids which the water contains.

Portable *Deminrolits* are made in two sizes, Mark IV and Mark V.

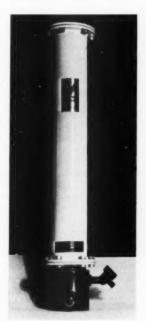
Water deioniser. The Loughborough water deioniser has been designed specifically for general laboratory use. It is a compact and easily operated unit consisting only of a plastics covered metal cartridge which screws into a polythene base. The cartridge contains a mixed resin bed and has an unusual feature in foamed plastics pads, set at intervals along its length, to perform two important functions; being initially compressed they readily prevent air pockets forming as a result of resin shrinkage, and in addition, counteract any tendency to channelling. In the base a conductivity cell monitors the output and indicates when quality falls below 2-5 conductivity units. The flow is controlled by a special polythene tap, which operates against mains water pressure in all parts of the country.

The setting of the conductivity cell ensures that, throughout the life of the cartridge, water superior to normal distilled water (as defined in B.P. 1953) is obtainable; in fact, say the company, the water is superior to conductivity water for most of the time. A typical analysis shows less than one p.p.m. of heavy metals, sodium, magnesium, calcium, silica, chloride, sulphate, ammonia or carbon dioxide.

The cartridge life varies with the mains water in use; from a hard water of 230 p.p.m. ionisable solids the output is about 50 gal. and then rises to 500 gal. in soft water areas.

Regeneration is carried out by Loughborough Glass Co. by an exchange cartridge service. By having a spare cartridge the deioniser can be kept constantly ready for use; the company arranges collection of exhausted cartridges for regeneration over most of the country. No special knowledge is called for in assembly or operation of this unit.

The complete deioniser costs \$45; a spare cartridge £18, and the regeneration is 25/- per cartridge.



The Loughborough water deioniser consists simply of a plastics covered metal cartridge with a polythene base.

Manufacturing Chemist—April, 1958

# The Sugar Detergents

By H. B. Hass\*

Scum-free soap, shampoos that don't sting, pleasant-flavoured tooth-paste, better food emulsifiers.... These are some of the products that can now be made because of the introduction of surface-active agents made from sugar. In addition to their technical advantages sugar detergents are economically competitive with those based on petroleum. The Sugar Research Foundation has licensed the process to a steadily growing list of manufacturers. Soon sugar detergents will be made in Britain. Here is an exclusive and authoritative article about them.

DETERGENTS belong to the broad category of surface-active agents, a term now abbreviated to "surfactants." A surfactant molecule consists of one or more hydrophilic (water-soluble) moieties, and one or more which are lipophilic (oil-The best detergents have the hydrophilic part at one end of the molecule and the lipophilic moiety at the other end. It is important that the hydrophilic and lipophilic portions should be in balance, as detergent power approaches a maximum value when the hydrophilic part of the molecule is just able to keep the lipophilic portion in solution in water.

Sucrose (cane or beet sugar) is almost freakishly soluble in water; it is roughly twice as soluble as maltose, and 10 times as soluble as lactose, both of which are isomers with the formula C<sub>12</sub>H<sub>22</sub>O<sub>11</sub>. It seemed likely, at least as early as 1947, that surfactants could be produced by esterifying sucrose with fatty acids.

#### **Experimental development**

Sugar Research Foundation Inc. set up a project directed by the late carbohydrate chemist, Geza Zemplèn, to produce these materials. The project ended in failure, however, because the classical pyridineacid chloride method was employed, and this reaction has a great tendency to form octoacyl derivatives which are much too lipophilic and almost completely insoluble in water.

Three companies in the United States and two in Germany had attempted, unsuccessfully, to make sucrose esters of fatty acids when the current project was begun at Foster D. Snell Inc. in 1952. The new approach was to attempt to

find conditions mild enough not to cause too much degradation of sucrose and yet be capable of producing a reasonably rapid alcoholysis.

$$\begin{array}{c} \text{RCO}_2\text{CH} + \text{C}_{12}\text{H}_{22}\text{O}_{11} \xrightarrow{\qquad \qquad \qquad \qquad } \\ \text{\textbf{Catalyst}} \\ \text{RCO}_2\text{C}_{12}\text{H}_{21}\text{O}_{10} + \text{CH}_3\text{OH} \end{array}$$

This proved to be quite difficult. In the first place, a solvent had to be found which would dissolve both the very hydrophilic sucrose and the very lipophilic methyl esters of fatty acids. This solvent had to be reasonably stable to alkali, and devoid of NH groups, which would form undesired amides under the conditions, of OH groups, which would form unwanted esters, and ester groups, which would also form unwanted esters by alcoholysis.

Fortunately, solvents such as dimethylformamide, dimethyl sulphoxide and pyrrolidone were available, or potentially available, in time for the research.

At first we attempted to go directly from glycerides to sucrose esters on the assumption that the eight hydroxyl groups of sucrose would give it a large statistical advantage over glycerol, which has only three. When it was found that essentially only the three primary hydroxyl groups of the sucrose are involved in this reaction it was clear why this expectation was not realised. Really good yields were not obtained until the methyl esters were used. The reaction tends to establish an equilibrium which can be continually disturbed by the vaporisation of the methanol.

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#### Present process

The present process involves a reaction between methyl or ethyl esters of fatty acids and sucrose, which is present in considerable molar excess. Dimethylformamide is the preferred solvent, and potassium carbonate the best catalyst. The reaction mixture should be well agitated and rigorously anhydrous. A few hours at 90°C, and 90 min. Hg absolute pressure suffices. At the end of the run the catalyst is killed, dimethylformamide distilled, and solvents, e.g. water and butanol, used to separate ester from excess sucrose. The monoester is pure enough for most purposes, although for food uses further treatment is necessary to remove traces of solvent. If the diester is desired, two moles of methyl ester of fatty acid are employed per mole of sucrose.

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#### Economic

The ready availability of sucrose, its stable price, low cost and chemical reactivity, have long been known. In spite of many articles pointing out these considerations, sucrose has been relatively neglected as a starting material for organic synthesis. It has been too readily assumed that sucrose could not compete economically with petrol-In the present instance sucrose must compete directly, not with petroleum but with the petrochemical ethylene oxide, which can also be brought into combination with fatty acids to form non-ionic surfactants. United States ethylene oxide is about twice as expensive as sucrose, and in other countries the ratio is even higher. In a very large factory the sugar esters can be made at an estimated cost of about 1s. per lb.

#### Properties of sucrose esters

In addition to its lower cost, sugar is far more hydrophilic than polye hylene oxide, which is insoluble in hot water. Many surfactants derived from ethylene oxide cannot be used in really hot water. Sucrose becomes more soluble as the temperature is raised until at its melting point it is miscible in all proportions. The sucrose esters likewise become more and more soluble as the temperature of the water increases.

The sucrose esters are solids which can be shipped in cheap cardboard containers. This contrasts with the liquid ethylene oxide derivatives, which are handled

in steel or glass.

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Sucrose esters, when pure, are colourless, odourless, virtually tasteless, edible, digestible, non-irritating detergents and emulsifying agents. Their detergent powers either built or unbuilt compare favourably with present detergents. There is reason to believe that they will produce far less foam in sewage disposal plants than the alkylaryl sulphonates. This matter is being studied at Durham University.

### Uses of sugar detergents

Twenty-five to thirty per cent of ester added to a bar of soap will eliminate the ring in the bathtub because these are lime-soap dispersants. Shampoos which won't sting the eyes and toothpaste with no unpleasant tasting soap or detergent flavour to mask, are easy to make now.

Work by Dr. F. E. Hance at the Experiment Station of the Hawaiian Sugar Planters' Association has opened up the field of pesticide emulsions to the sucrose esters. Formerly it was necessary to use the herbicide based on Diesel oil within a day or two after emulsification. With sugar esters, the emulsions have lasted for at least

two months.

In aged or other persons whose liver no longer produces adequate quantities of emulsifying agents, the digestion of fat becomes instituted in the most common digestive disorder. On the high-fat British or American diet, it is sometimes nearly impossible for such people to meet the caloric requirements of the body. In extreme cases, they lose weight steadily until death ensues. As the fats remain in the digestive

tract, intestinal lipases convert them to soaps, which precipitate the calcium ions in the diet. Resulting low blood calcium levels cause decalcification of the bones. Osteoporosis sets in. Bones break easily and mend slowly, or not at all. Dr. David Alan Turner, of Sinai Hospital of Baltimore, has shown that people who otherwise could not digest fat can do so efficiently with a little sugar ester in the diet.

There is a distinct likelihood that feed efficiencies can be improved by adding sucrose esters to animal feeds. This is under investigation.

On digestion, the sucrose esters form glucose, fructose and fatty acid in the intestinal wall. The body has been handling these foods since long before we were human.

There are many uses for food emulsifiers. One is to increase the speed of rewetting of dried foods; another is to retard the staling

of breads.

A bread staling retarder is a substance of which one end of the molecule is strongly adsorbed to starch while the other functions as a lubricant. Such materials tend to surround starch particles with hydrocarbon groups which interfere with the starch particles hydrogen bonding with each other

and setting up a rigid structure.

The more effective washing of fruits and vegetables before use is now practical because of the absence of taste and toxicity of

the new detergents.

It is ridiculous that we still shake French Dressing before use to re-emulsify it. This custom deserves to be stored with the dodo bird and the buggy whip. All that is needed is a suitable emulsifying agent.

#### Conclusion

Patent applications covering the process and product have been made in the principal countries of the world. Patents have issued in:

Argentina (2) France
Belgium India
Bolivia Israel
Chile Jamaica
Union of

Colombia Union of South Africa and are in process of allowance

elsewhere.

Sugar Research Foundation has a policy of issuing only nonexclusive licences and charging low royalty rates, since our objective is to expand markets for sucrose and its by-products.

In England we have one licensee—Howards of Ilford. We are proud to be associated with this old and reliable chemical manufacturer.

# **Supplying Laboratory Chemicals**

The advantages of closer liaison between the supplier of chemicals and the customer were discussed by Mr. K. G. A. Hammer of May and Baker Ltd. in a lecture on "Problems in Supplying Laboratory Chemicals." He was speaking at a meeting of the Fine Chemicals Group of the S.C.I. at Belgrave Square, London, S.W.1. Placing his subject under three main headings he dealt first with the consumer's point of view, then with manufacturers' problems, and finally made some suggestions as to how the customer could help the supplier and vice versa. assumed that consumers would have a stock control system so that the work of their laboratories was not jeopardised by running out of essential chemicals.

Before any chemical is produced the works require to know the estimated annual requirements so that such matters as the most economic batch size and frequency of manufacture can be decided. The quality acceptable to the majority of users must also be ascertained and suitable analytical control procedures established to ensure that the product complies with the requirements of the specification.

When a new product is being considered, the factors to be evaluated are the general immediate need, the possibility of overstocking, its potential rôle in research, development and analytical work, the extent of complementation in existing products and facilities of reagents already produced, industrial hazards incident to its manufacture, and finally the cost, availability and purity of starting materials. If a satisfactory manufacturing process is developed the questions of labelling and packaging have to be settled. The poisonous, corrosive

(Continued on page 161)

# PROGRESS REPORTS

# **THERAPEUTICS**

Diuretics • Rauwolfia and other hypotensives • Cortisone derivatives • Analgesics

By S. J. Hopkins, F.P.S.

#### **Diuretics**

CONSIDERABLE attention has been devoted in recent years to the problem of diuresis. This has been directed to the search for an orallyactive compound that could supplement or possibly even supplant the injectable mercurial diuretics as exemplified by mersalyl. compounds with a therapeutic degree of oral activity have in common the disadvantage of causing gastric disturbance, which may be severe enough to prevent the drug from being given in an adequate dose. Thus aminometradine, when given in suitable doses, is at least half as effective as mersalyl, but at least 50% of patients needing such therapy are unable to tolerate the required dose.

More promising results have been reported by Jose<sup>1</sup> and Wood using amisometradine (Rolicton).

Amisometradine

liminary animal experiments indicated that of several similar drugs examined, amisometradine was at least as effective as aminometradine, and caused much less vomiting. A elinical trial on 20 patients with heart failure was carried out, using mersalyl as the standard, and care was taken to exclude certain extraneous factors before assessing the Thus the trial was not begun until 10 days after admission to hospital, because a spontaneous diuresis often occurs after a few days' bed rest. Doses of amisometradine and mersalyl were given alternately to each patient at intervals of a few days, and these

paired changes reduced any variation in response due to clinical improvement following therapy. It soon became obvious that amisometradine, although inferior to mersalyl, was an oral diuretic of considerable potency, and greatly superior to aminometradine from the point of view of gastric tolerance. Some occasional delay in response was noted with some patients, but this was offset by an extended action following the administration of the last dose. The pattern of electrolyte loss after amisometradine appears to resemble that following aminometradine, i.e. an excretion of sodium and chloride in approximately equal amounts, but the precise mode or point of action has not yet been determined.

It will be recalled that acetazolamide is a non-mercurial diuretic, which produces an alkaline urine containing sodium bicarbonate. The action of acetazolamide is selflimiting, and discontinuous therapy

is essential.

Clark<sup>2</sup> and Rock have used the S336-labelled compound in order to study the distribution and metabolism of this drug. They devised a method of synthesis which is economical in respect of time and materials, and their paper gives the essential details. The method may have applications in the synthesis of other thiadiazole sulphonamides.

Other research is still concerned with mercurial diureties, as the desired combination of potency, stability, safety, and tolerance in a single compound has still to be fully achieved. The drugs now in clinical use are mainly derived from compounds having an alkyl amide structure of the following basic type: R<sub>1</sub>—NH—CH<sub>2</sub>.CH(OR<sub>2</sub>) CH2.H R3; but Shapiro3 et al. have reported on a new series of com-

pounds incorporating the s-triazine ring. By using groups known to have diuretic activity per se, it was hoped to produce compounds having an adequate degree of diuretic potency at low dosage levels. The main work was done on compounds with the following basic structure:

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in which X represents theophylline. carbonylsalicylamide (1,3,2,-benzoxazine-2-4-dione); ascorbyl, potassium acid fluoride, chloride or bromide.

The carbonyl-salicylamide group was used because its structural and bonding properties are analogous to those of theophylline, and ascorbic acid has been claimed to influence mercurial diuresis. The fluoride compound was used because of the rôle played by enzymes in diuresis, and of the known action of fluoride ions on enzyme systems. Further work was also done on triazine compounds containing three atoms of mercury. The diuretic responses showed considerable variation, and indicated interesting relationships between structure and activity. The authors, however, are not unaware of the limitations of the methods used to evaluate diuretics, and further investigation is necessary before this type of compound reaches clinical trial. Some useful details of the synthesis of intermediates are also given.

The introduction or new and more powerful drugs sometimes leads to an unnecessary neglect of older remedies. Recently Papp4 and Smith have made a plea for a new appraisal of urea, which they describe as the "forgotten diuretic." Although less powerful than the mercurial diuretics, the drug is not toxic, and the authors point out that at the worst it is never harmful, and at the best it may give relief in severe valvular heart disease to a degree not easily or safely attained with other diuretics.

#### Hypertension

The alkaloids of Rauwolfia are still being studied extensively, and Ford et al. have made a comparative study of four alkaloids, and the response when given by injection. Twenty-four patients with severe hypertension were selected for treatment, and kept on a low sodium diet. Adequate time was allowed for stabilisation and no reductions in blood pressure were observed after placebo injections of saline. Using reserpine as the standard, the actions of deserpidine, rescinnamine and serpentine was assessed.

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Deserpidine, also known as

raunormine, recently isolated from Rauwolfia canescens, and rescinnamine, described as the trimethoxycinnamic ester of methyl reserpate, both appeared to be pharmacologically similar to reserpine.

Deserpidine

#### Serpentine

Serpentine was less active, and a ten-fold increase in dose over that of reserpine was necessary to produce a similar hypotensive effect. Further experience indicated that the best results with serpentine were obtained when the drug was given by slow intravenous infusion rather than as a single injection. In summing up their results, the authors conclude that reserpine

Rescinnamine

and rescinnamine remain the drugs of choice. The response to the other alkaloids is unreliable, and is accompanied by untoward sidereactions.

Hydralazine is also used extensively in the treatment of hypertension, but some undesirable

side-effects have been noted following This was first long therapy. reported by Morrow<sup>6</sup> et al., who described a syndrome which at first was indistinguishable from acute rheumatoid arthritis. Dunstan et al. indicated that in the more severe forms the condition simulated severe lupus erythematosus. Douglas8 et al. made a study of these metabolic effects, and showed that the compound inhibited biological acetylation. This was carried out with a variety of substances, including sulphanilamide, and acetylation is a significant factor in the metabolism of a number of other medicinal sub-The basic mechanism stances. of the action of hydralazine is still unknown, and earlier speculations have been complicated by a recent report by Reynolds9 and Caldwell of a case simulating rheumatoid arthritis after only a short course of the drug. This suggests a hypersensitivity rather than a toxic reaction or a depletion phenomenon following long treatment. The main practical significance of the syndrome at present is the fact that hydralazine is a tool whereby a condition closely resembling lupus erythematosus can be produced experimentally. Further investigation into this aspect of hydralazine therapy, or into that of acetylation generally, may open up new fields in the study of the collagen disorders and hypertension, and lead to a clearer understanding of the underlying factors manifested by the clinical symptoms.

#### Corticosteroids

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OCH<sub>3</sub>

Potent as the early corticosteroids were, their side effects made them unsuitable for prolonged maintenance treatment, and much research has been devoted to this aspect of steroid therapy. The introduction

of fluorohydrocortisone was an indication of the very high potency of certain derivatives, and the synthesis of prednisone and prednisolone showed that salt and

water retention did not necessarily follow the administration of a corticosteroid compound. More recently, Rein¹o et al. have reported on the value of Δ9α-fluoro-16α hydroxyhydrocortisone diacetate, also known as triamcinolone diacetate or Aristocort. This compound, which was synthesised by Bernstein¹1 et

al., is 18-36 times more potent than hydrocortisone (rat liver glycogen test), and does not cause sodium retention. It has a profound anti-rheumatic effect, and balance studies show that whilst there is a significant degree of sodium and water loss during triamcinolone therapy, there is little alteration in the nitrogen, calcium or potassium balance. In dermatological conditions, triamcinolone had marked anti-inflammatory properties, and produced systemic effects of similar therapeutic value to those of prednisolone, but in two-thirds to threequarters of the dose. In the cases to which the report refers, the incidence of side-effects was low, and there was no need to interrupt treatment. The increase in appetite that sometimes occurs during steroid therapy was not observed, and in some instances a loss of weight, possibly due to a reduction in fluid retention, was recorded. In severe dermatoses the anti-inflammatory and antipruritic properties of the new compound have considerable potential value.

Another steroid of interest is methylprednisolone (Medrol) in which a methyl group is substituted in the 6x-position of the prednisolone molecule. From laboratory findings, the new compound has more than three times the glucocorticoid activity of prednisolone, and more than twice the antiinflammatory power. In their report on this compound, Feinberg12 et al. point out that the relative potency of steroids in asthma and allergic conditions cannot be evaluated in terms of the response shown by animals, but their clinical experiences with the drug indicate that the effective dose is lower than that of prednisolone. Water retention is also less, and the increase in appetite that sometimes occurs during steroid therapy was not observed.

In ophthalmology, cortisone and hydrocortisone still retain their pre-eminent place, and so far prednisone and prednisolone, although more potent, are relatively little used. The older preparations are used as suspensions, which, however well prepared, lack the uniformity of solutions. Microulceration due to crystal deposits is also known and on general grounds a solution is much to be preferred. Larson 13 and Fercho have used prednisolone (0·1-0·2%) in 10 %

Triton solution for ocular inflammation, and report good results. It was used only in the acute stages, but response was prompt, and side-effects were few. These were mainly subjective, but any initial discomfort was of short duration. As an alternative to suspensions of cortisone, such preparations appear to warrant further investigation.

#### Tic Douloureux

This is one of the most distressing forms of neuralgia, and is characterised by attacks of severe pain, often triggered off by some relatively small stimulus. A variety of analgesic drugs have been used in treatment, but it has long been known that attacks may sometimes be suppressed by vasomotor agents. Thus nicotinic acid, histamine and amyl nitrate have been used in this way, but the potentialities of the newer vasodilator drugs in this field have been overlooked.

Poole<sup>14</sup> has now reported on the dramatic relief which can follow the intravenous injection of tola-

zoline. The relief, which may last some hours, is accompanied by an inactivation of trigger areas, and the method is of considerable interest, not merely as a therapeutic measure but also as indicating a line of study. Relief outlasts the period of activity of tolazoline, and triggered attacks are more easily suppressed than spontaneous ones. There is some evidence that there is some ischaemic factor present in the attacks, and the relief afforded by vasodilators may be due in turn to the relief of nerve ischæmia.

Remission of attacks often follows injections of procaine or alcohol, and Poole makes the interesting suggestion that the relief obtained from such injections may be due, in part at least, to the long vasodilatation thus provoked. The fact that relief is experienced long after the vasodilatation has disappeared does not necessarily disprove the ischæmic theory of causation, as a vasomotor response may cause a return to the physiological state characteristic of a remission.

# **Pest Control Chemicals**

New insecticide • Residues • Pyrethrum synergists • Chlorbenside • New weedkiller • Antibiotics • Timber pests Fluoroacetamide

### By D. P. Hopkins, B.SC., F.R.I.C.

#### New insecticide

A NEW U.S. product, named Sevin (1-naphthyl N-methylcarbamate), has been described.1 Although toxicity data are not complete, it is claimed to have low mammalian toxicity but very high toxicity to a wide variety of crop insects. It acts by inhibiting the cholinesterase enzyme but, unlike the similar effect exerted by phosphorus insecticides, it does not seem to form a chemical compound with the enzyme. Good residual activity is claimed. The insecticide has emerged after much exploration of the naphthyl carbamate series, and it is suggested that this compound in the series offers the best combination of high insect toxicity allied with low human and animal toxicity.

#### Parathion toxicity

A potentially serious query about residual toxicity to humans and animals has arisen with parathion and possibly other organo-P in-

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secticides also. This is due to chemical changes caused by exposure to ultra-violet light, changes that produce different cholinesterase inhibitors which may not be detected by normal analytical methods when residues are tested. Toxicity studies may therefore have put forward evidence less valid than has been assumed. However, this query seems to have been resolved in a paper by U.S. Food and Drug Administration workers2 which reports rat-feeding tests with ultra-violet exposed parathion material. The biological results closely followed the indications of chemical tests upon the material, which would suggest that no undetectable but toxic substance is formed by light exposure.

#### Residues in milk

On this subject of toxicity of residues, a general review has dealt with pesticide residues in milk.<sup>3</sup> With dairy products making up 29% of the average diet (in U.S.A.) the health hazards of toxic residues in milk are greater than for any other food item; but studying toxicity problems of an end-product like milk in relation to the uptake of residues on fodder eaten by cows involves many complex factors. The paper hardly does more than present these difficulties, but it puts the subject into clear perspective.

#### **Synergists**

More work on chemical structure and pyrethrin/allethrin synergist activity has been reported.4 study of more than 200 methylenedioxyphenyl compounds with many different side-chains showed that the unit of structure giving synergistic properties was the 3,4-methylenedioxyphenyl group. Few compounds not possessing this group had any synergistic power. Those that did exercise

sync gism without the group stated above were mainly amides, but their synergistic activities were substantially weaker. This fairly definite elucidation of the structural requirement for pyrethrin synergism seems an important stride forward. The use of natural pyrethrins is likely to expand with increasing public health attention to residues of chlorinated hydrocarbon pesticides, and also with the development of resistance to so many other insecticides. But the price of natural pyrethrin materials remains high, making the use of synergists to increase pyrethrin value an economic necessity.

As for insect resistance, it has been stated recently<sup>5</sup> that common houseflies are developing resistance to organo-P substances. Seven strains in Florida were collected during 1957 and they showed 3 to 18 times the normal resistance to parathion.

#### Chlorbenside

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A new paper on chlorbenside6 has discussed the action of this fruit insecticide when used as an early-season spray against red spider mite. Results given show that the persistent larvicidal effect of residues is more important for control than the direct kill of winter eggs. Growth of foliage after early spraying is a factor likely to "thin out" the spray residues, but it would appear that delaying spraying to reduce this difficulty is not helpful for, by making applications later than the time when adult mites begin to develop, more damage to foliage is likely. Also, tests on varieties with differing foliage growth rates during this critical period revealed no differences in early-season spray effectiveness.

### Systemics

It has been reported that systemic insecticides gave control in 1957 over sugar beet yellows disease to an extent that yields were raised by up to 4 to 5 tons of roots per acre. Effectiveness depends upon applying early enough to kill the first aphids that arrive. The virus infection is not wholly prevented but its spread through the crop is greatly delayed.

A new organo-P insecticide, Phosdrin, has been announced.<sup>8</sup> Its breakdown into harmless products is speedy and it may be applied to vegetable crops three days before marketing. The action is threefold — by contact, fumigant and systemic operandi.

#### Weed control

A new weedkiller, 1:1'-Ethylene-2:2'-dipyridylium dibromide, has been described.<sup>9, 10</sup> Its exceptional activity was discovered by British workers in research on quaternary ammonium compounds. Small-scale tests indicated toxicity to cereals at fairly low rates, but field work has shown a more promising selectivity for spray-rates up to 1 lb. per acre given at 2 to 3 leaf stage. Even at lower rates than this the new material is active against several weeds that are resistant to 2,4-D and MCPA. It appears to have exceptional promise as a potato haulm destroyer and a pre-harvest desiccant for clover seed crops. Development has not yet passed field trial stages, so the full potential of this new weedkiller cannot yet be soundly appraised. However, progress so far reported foreshadows the arrival of an important new weedkiller.

A combination of MCPA and TCB — trichlorobenzoic acid — has been marketed as "18-15."<sup>11</sup> Its main function seems that of selective weed control for cereal crops, and it is claimed to control a wide range of weeds, including cleavers. It is non-selective if clovers are undersown. The action of TCB upon MCPA-resistant weeds is not one of hormonal-type deformation; rather, these weeds are arrested in growth so that they do not increasingly compete with crop plants. Low volume spray application is recommended as the most effective method.

New methods for weed control with sugar beet have been briefly described. <sup>12</sup> A layer of absorbent carbon placed between seed and weedkiller has enabled higher rates of pre-emergent weedkillers to be given without causing crop damage. Weedkillers mentioned are propham, CDEC and endothal.

#### Fluid grinding

A new and improved milling process for making insecticide dusts has been discussed. The problem of heat generation long associated with most mechanical grinding methods has been eliminated. The new approach of "fluid grinding" utilises high speed streams of an

elastic fluid to grind particles by their own collisions.

The problems that confront designers of emulsifiable concentrates have been surveyed. 14 The different requirements for good field performance, long storage life, etc., are generally in conflict, so that formulation must aim at optimum levels for each desired property in the finished product, levels that must be decided upon according to the market areas and also the price obtainable. This is an excellent paper.

#### Antibiotics

Griseofulvin has now been officially "released" for use in horticulture. It is effective against Botrytis (or grey mould) on lettuce under glass. Cost of treatment seems rather high, but the benefit from control is likely to be worth three to four times the outlay; 40-50% control is achieved, possibly more from a double dusting treatment. Control even to this extent brings increased size of saleable lettuces, plus much saving of labour in trimming lettuce before sale. The antibiotic is marketed as Grisovin.

A combination of streptomycin and oxytetracycline known as Agri-mycin 100 is reported in U.S.A. to be highly effective for downy mildew control with hops.16 Eighty-five per cent. effectiveness of control has been attained by two spray treatments. The report is somewhat obscure. Though it refers mainly to the above mixture, the quoted statements from a research centre refer only to one of the two antibiotics, strepto-The full version of the paper on which this U.S. report has been based should be studied to clarify this point; it would seem that to date the paper has been only orally presented.

These two items typify the advances being made in the development of antibiotics as plant disease control substances. Test data establishing economic as well as scientific effectiveness are being steadily accumulated and this is accompanied by the marketing of commercial products based upon antibiotics.

#### Timber pests

The control of pests that attack timber has often been advocated. A new U.S. paper examines this subject with particular regard to

its economic feasibility.17 Tests using a 12% gamma-BHC wettable powder showed 81.5% reductions in insect attacks upon cut timber, and about 40% reductions in other consequent forms of surface decay or deterioration. The benefits of this control upon the yield of pulp obtained from pine timber are difficult to assess, however. The economic arguments presented in the paper are confusingly elaborate, involving a new method of assessing pulp-yield from timber to show benefit from gamma-BHC treatment. It is finally claimed that a net profit of \$0.51 per cord of timber is shown after using the insecticide at a treatment cost (total) of \$0.24 per cord. clearer presentation of this argument would have been more convincing. However, it is stated that after these trials in 1955 and 1956 had been conducted, the two largest producers in the area used have been spraying all wood cut during the season of pest activity and all wood that will be stacked during that period. This evidence seems more convincing. The paper is well documented for other contributions on this subject.

#### Fluoroacetamide

English workers have investigated the mammalian toxicity of fluoroacetamide.18 This substance, an intermediate in the preparation of sodium fluoroacetate, already much used as a rodenticide (Compound 1080), has also been suggested for rodenticidal use. The conclusion is reached that fluoroacetamide is a much safer substance to handle than either sodium fluoroacetate or the fluoroacetic esters. cases of toxic effects, acetamide may be used as an antidote, a safeguard not as fully applicable with sodium fluoroacetate.

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# **Analytical Chemistry**

Fine chemicals • Photographic chemicals • Pharmaceuticals and drugs • Antibiotics • Hormones • Essential oils Detergents • Weedkillers

### By William I. Stephen, B.SC., PH.D., A.R.J.C.

ORGANIC solvents play an important rôle in most branches of chemistry and large amounts are used in most processes. Because of the costs involved, it is essential that the manufacturers should supply solvents conforming to definite specifications, as a form of guarantee to the users. To meet this uniform requirement, British Standard Specifications are available for most of the important organic solvents and these are subject to occasional revision. New specifications have recently been issued for iso-propyl alcohol,1 diacetone alcohol, acetone, amyl acetate, dethyl lactate, diethyl phthalate,<sup>6</sup> and hexachloroethane.<sup>7</sup> These revisions lay down closer limits for impurities, and new limits for their specific gravities have been imposed. The limits for been imposed. water content based on determinations by the Fischer method have also been reduced.

#### Fine chemicals

A colorimetric method has been described for the determination of micro-amounts of pentachlorophenol.8 An ether extract containing less than 2 mg. is evaporated, and the residue is treated with concentrated nitric acid on a boiling water-bath. A drop of saturated urea solution and 5 drops of 0.2% ethanolic tetramethyldiaminodiphenylmethane are added with thorough mixing, followed by 1 ml.

of saturated sodium acetate solution. A blue-green precipitate is formed which is dissolved in 5% acetic acid and the extinction of the resulting solution is measured at 600 mu. The method is reliable for 0.1-1.5 mg. of pentachlorophenol. Mixtures of benzoic and salicylic acid can be determined by differential titrimetry in non-aqueous solvents.9 Dimethylformamide is a suitable solvent for the mixed acids which can then be titrated with sodium methoxide. method works satisfactorily for mixtures of the pure acids, and when the acids are compounded in ointment form. Mixtures of benzoic, p-hydroxybenzoic and salicylic acids are readily separated and identified by paper chromatography using acetone - aqueous ammonia solution-water (90:3:7) as the mobile phase.10 The dry papers are sprayed with an ammoniacal solution of silver nitrate in ethanol, and after further drving a spray of pyrogallol is applied. The sensitivities are about 7, 3, and 3  $\mu g$ . respectively for the above acids.

A procedure has been developed for the determination of boron in some organo-boron compounds,11 particularly the methanol-soluble alkyl hydroxy-boranes. The B-C bond is oxidised by H<sub>2</sub>O<sub>2</sub> and the boron is distilled from the reaction mixture as methyl borate. method can also be used for alkylboranes, decaborane and other methanol-soluble organo-boron compounds.

A critical study has been made of the micro-determination of citric acid by the pentabromacetone methods. 12 Numerous factors influence the results but colour-fading is the most significant. Glycerol has been found to be a more effective colour stabiliser than pyridine or ethylene glycol, but under suitable conditions the use of a stabiliser is not really necessary.

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Paenidone-hydroquinone develohave been quantitatively analysed by making use of the fact that pyrazolid-3-ones are quantitatively oxidised by iodine in strongly acid solutions to give corresponding pyrazolones; under these conditions quinol is not oxidised.13 Phenidone (1-phenylpyrazolid-3-one) is determined by acidifying about 100 ml. of the developer solution with sulphuric acid to a pH of 0.5. The solution is then boiled for 15 min. to remove sulphur dioxide, cooled to room temperature, and starch solution is added. A slight excess of 0.05N iodine is added and the mixture set aside for 5 min. The excess iodine is then titrated with standard sodium thiosulphate solution.

Hydroquinone can be determined rapidly and quantitatively by titration with iron (III) solutions.14 The sample, the pH of which is adjusted to between 3.8 and 5.0, is titrated with 4% iron (III) chloride solution at a rate of 10-20 drops per min. using a yellow background and shaking after the addition of each drop. A green colour forms transiently, and the end-point is reached when this colour no longer forms. The iron solution is standardised against a solution of pure quinol. Results show a maximum error of 3.3% on samples containing 0.02-1.0 g.

#### **Pharmaceuticals**

The determination of 4-acetamido-N - lauroylnaphthalenesulphonamide cannot be carried out by conventional methods for sulphonamides because the lauroyl group inhibits the production of colour. 15 A new procedure is proposed for the determination of 0.5-3.5 mg. of the substance which involves treatment of an acid hydrolysed extract of the substance with diazotised p-nitroaniline. The colour thus formed is measured at 520 mu. Details have been given of a modification to the analysis of sulphonamides.<sup>16</sup> The end-point in the diazo reaction with sulphonamides is more easily detected using a test paper impregnated with a 3% solution of dimethylamino-benzaldehyde. The end-point occurs when the reaction mixture fails to impart a yellow colour to the paper.

German workers have found that certain disulphonamide salts such as di(p - chlorobenzene sulphon)amide and di(p-aminobenzene sulphon)amide can be used for the characterisation of many pharmaceutical bases.<sup>17</sup> The melting point of 35 such derivatives and directions for their preparation are given.

Pyrazine derivatives such as pyrazinamide and pyrazinoic acid can be determined spectrophotometrically at 500 mu and 470 mu respectively using a solution of sodium pentacyanoaminoferroate as the colour-forming reagent.18 An orange-red complex which is stable for at least 24 hr. is formed enabling 1-50  $\mu$ g. of each substance to be readily determined. Used as a spot test the reaction is sensitive to 0.05  $\mu$ g. of the amide and  $0.2 \mu g$ . of the acid. Additional information has recently been given for the identification of glucosulphone (Promin).19 includes its precipitation from solution by methanol, its lack of a sharp melting point, its rapid reduction of Fehling's solution on warming, its rapid decomposition in the presence of barium nitrate and nitric acid to give barium sulphate, its decolorisation of iodine in neutral or acid solution, its positive reaction for a primary aromatic amine with a-naphthol and sodium nitrite, and its formation of an impure osazone, probably glucosasozone, with phenylhydrazine. A bromimetric procedure is recommended for the determination of Veritol and Paredrine (pholedrine and hydroxyamphetamine respectively).20 Quantitative bromination occurs in acid solution, the excess bromine being determined thiosulphatometrically. The method is suitable for about 15 mg. of each base, and recoveries of 99.5-100.5% are obtained.

Kaistha<sup>21</sup> has described a method for the gravimetric determination of camphor which has been modified to deal with medicinal preparations of camphor, particularly in essential oils. The separated oily fraction containing about 0·2 g, of camphor is dissolved in 80% aldehyde-free ethanol and refluxed with semi-carbazide hydrochloride and potassium acetate for 3 hr. The with water reaction mixture is diluted and the precipitated semicarbazone is filtered off and weighed.

#### Drug

A new assay of artemesia has been described in a Pakistan journal.<sup>22</sup> The plant material is mixed

with sodium carbonate, shaken with aqueous ammonia and then, with benzene for 3 hr. standing overnight, the benzene is filtered off and an aliquot evaporated to dryness. The residue is dissolved in 5% baryta water with warming; the solution is then filtered, acidified and extracted with several portions of carbon tetrachloride. The residue from the evaporation of the combined extracts is dissolved in boiling 15% ethanol, and treated with charcoal and kieselguhr. cooled filtrate yields pure crystalline santonin, which is filtered off and weighed. Corrections are made for the santonin retained by the charcoal and in the filtrate.

A microsublimation procedure can be used to identify barbiturates.23 Normal conditions are used to give the microsublimates which possess characteristic microscopical pictures and melting points. Using these data, it is possible to identify phenobarbitone, barbitone, allobarbitone, methylphenobarbitone, hexobarbitone, cyclobarbi-tone and Irenal. Crotylethyltone and Irenal. barbituric acid (vinbarbitone) is detected by paper chromatography, colour and precipitation reactions.24 Crystalline derivatives are the p-nitrobenzyl ester (m.p. 133°C.) and the condensation product with xanthhydrol (m.p. 223°-224°C.). For quantitative purposes, acidimetric titration in aqueous or non-aqueous media can be used; bromimetry and argentimetry are also useful, particularly the latter, because of its high selectivity. Mixtures of amylobarbitone (Amytal) and sodium pentobarbitone (Nembutal), unlike most mixtures of common barbiturates, are not readily separated by paper chromatography.25 Dealkylation of Nembutal occurs when it is heated with concentrated sulphuric acid for 1 hr. at 100°C.; 5-ethyl-barbituric acid is formed, whereas Amytal is not The mixture is heated affected. in this way and diluted with water. The aqueous solution is extracted continuously with ether, and the dried residue from the ether extract is taken up in chloroform. Aliquots of the chloroform solution (25-50µ1.) are subjected to chromatography, the spots being located by u.v. fluorescence.

Diazotisable amines such as procaine, benzocaine and sulphonamides can be determined colorimetrically by coupling with thymol.<sup>26</sup> The simple procedure is used on  $20\text{-}200\mu\mathrm{g}$ . of the amine and modifications enable tablets, injections and other pharmaceutical preparations to be readily analysed.

#### Alkaloids

The reactions of ammonium phosphomolybdate reagent, nitric acid, sulphuric acid reagent and Marquis reagent with some synthetic analgesics are compared with those of morphine and its derivatives.<sup>27</sup> The substances examined include methadone, isomethadone, pethidine, morphine, dihydrohydroxycodeinone, codeine, ethylmorphine, dihydrocodeinone, dihydromorphinene and papaverine.

The methods of Sakal and Merrill<sup>28</sup> and of Dechene<sup>29</sup> have been compared for the assay of reserpine in tablets.<sup>30</sup> The former method based on u.v. absorption is not very suitable, but Dechene's method based on u.v. fluorescence is satisfactory. A fluorimetric method is recommended for the determination of 11-demethoxyreserpine. 31 A single fluorescent maximum appears at 360 mu and two activating maxima at 280 and 365 mµ. After reaction of the alkaloid with cerium (IV) in 5N-acetic acid, the intensity of fluorescence increases tenfold, and a linear response is obtained up

to 5 µg; 0·5 µg. can be detected.

Strips of Whatman No. 4 paper, impregnated with a mixture of 35 parts of formamide, 10 parts of urea and 5 parts of water, diluted, after the pH has been adjusted to 8·5 (ammonia solution), with 50 parts of methanol are used to separate the ergot alkaloids.<sup>32</sup> The chromatograms are developed with a mixture of benzene and light petroleum (4:6) for about 6 hr. with the solvent overflowing. All water-soluble ergot alkaloids can be separated in this way.

An interesting complexometric determination of semi-micro amounts of narcotine, papaverine, codeine, strychnine and brucine depends on their reaction with 0·028 M-bismuth-EDTA in 0·5N-hydrochloric acid, in the presence of 0·112M-potassium iodide. The iodobismuthate complexes are precipitated and free EDTA is produced. After centrifuging, the free EDTA is determined on an aliquot of the solution by titration with 0·01M-zinc sulphate in a borate buffer (pH 9·1) using Eriochrome black T as indicator.

#### Antibiotics

A new rapid method is described for the colorimetric determination of dihydrostreptomycin and streptomycin.34 It is based on the red colour produced when the antibiotics are mixed with a-naphthol, and sodium hypobromite in alkaline solution. The extinction of the coloured solution is determined at 530 mu; results are in good agreement with those of the B.P. microbiological method. Tyrothricin has been determined by the spectrophotometric method Rittenberg and co-workers.35 a modified procedure, the results obtained agree to within + 2% of those obtained by the hæmolytic method.

#### Insulin

Japanese workers<sup>36</sup> have described the analytical separation of insulin from whale pancreas by partition chromatography. Porter's method<sup>37</sup> is used, but the solvent system, acetic acid, butanol, water (1+3+4), always gives rise to a protein impurity in the insulin. An investigation has, therefore, been made to find a more suitable developer for the separation, and it has been found that the optimum composition is 8% of acetic acid, 25-50% of butanol, and 40-70% of water.

#### Vitamins

A simple procedure is recommended for the determination of ascorbic acid in foodstuffs (wines, beers, syrups).38 Ascending paper chromatography with n-butanol as solvent is used, and the band corresponding to an  $R_F$  value of the acid (0.3-0.4) is cut out and titrated after stabilisation with oxalic acid. This is more accurate than determining the area of the spots revealed using dichlorophenolindophenol or exposing the paper to air for some time. The U.S.P. method for the determination of folic acid, involving reduction, diazotisation and coupling with N-1naphthylethylenediamine, is affected by the presence of large amounts of iron (II) salts. A recent investigation39 has shown that when the reaction is carried out in the presence of 3% phosphoric acid as much as a 500-fold excess of iron (II) is masked as the stable phosphate complex.

Danish workers have found that a-tocopherol can be quantitatively determined by chromatography on

secondary magnesium phosphate. 40 Carotene, vitamin A and other tocopherols are removed in one step without the need for prior reduction of the sterols present. About 98-100% of the a-tocopherol is recovered. Chromatography is carried out on a light petroleum extract and the a-tocopherol is finally determined colorimetrically with iron (III) chloride and 2: 2'-dipyridyl. The chromatographic procedure can also be used for the quantitative determination of individual tocopherols.

#### Hormones

A colorimetric method has been advanced for the determination of micro amounts of diencestrol and stilbestrol. The nitrated derivatives of these substances react with alkali to give intense yellow solutions which obey Beer's law. In the present investigation, a Pulfrich photometer is used with an S42 filter. The method is suitable for 50-80  $\mu g$ . of diencestrol and 40-60  $\mu g$ . of stilbestrol. It can be applied to pharmaceutical products.

#### **Essential oils**

The Essential Oil Sub-Committee of the Society for Analytical Chemistry Analytical Methods Committee has published recommendations for the determination of linalol in essential oils.42 Of the several methods investigated, two are found to be worthy of further study. The first is that of Glichitch, 43 which is satisfactory provided strict attention is given to reagent purity. It is, however, tedious, requiring four days for completion of the analysis. The second method, that of Fiore,44 is more rapid but somewhat less dependable.

Stanley and Vannier45 have analysed citrus oils, in particular lemon oil, for coumarin compounds by solid-liquid partition. seven substituted coumarins in lemon oil are separated by downward development using the technique of Miller and Kirchner.46 The resultant chromatogram is examined by u.v. light when five of the spots are sufficiently separated to permit their quantitative re-Using 5-geranyloxycoucovery. marin and 5:7 - dimethoxycoumarin, standard curves of concentration against absorption at 320-330 mu have been constructed. Lime oil can be detected by means of the absorption peak at 270 mu due to iso-pimpinellin.

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A new method for the determination of detergents which is applicable to the alkali-metal salts of sulphated long-chain primary aliphatic alcohols (alkyl sulphate salts) depends on the precipitation of compounds of the type (ROSO<sub>3</sub>)<sub>2</sub> Ni(NH3)4 with an excess of nickel ions in ammonia solution.47 Shortchain compounds (up to ten carbon atoms) are not precipitated. The precipitate can be filtered off and the analysis finished gravimetrically, but a more elegant procedure involves the titration of the excess nickel in the filtrate with EDTA.

#### Herbicides

The colorimetric determination of dinitrophenols in herbicides (and insecticides) is based on their conversion to aminoquinoneimines48 which are subsequently determined in aqueous solution. The sample is treated with zine and sulphuric acid to give the corresponding amino compound which is then oxidised with potassium dichromate to the coloured quinoneimine. The method is accurate to ± 3%. Chloro - derivatives of 2-methylphenoxyacetic acid have been determined by i.r. spectroscopy. 49 In particular, 4-chloro-2-methylphenoxyacetic acid has been determined in the presence of the parent acid, its 4:6 dichloro- and 6chloro-derivatives.

An analytical study has been made of 2-naphthoxyacetic acid.50 A fluorimetric method is suitable for aqueous extracts containing 1-10 µg. of the acid, but not for soil extracts. The solution is evaporated to dryness and the residue is treated with 10 drops of a reagent solution consisting of 1% of sodium arsenate in concentrated sulphuric acid; this mixture is heated at 105°-110°C. for 10 min. After cooling, the mixture is diluted and treated with 10% aqueous ammonia and the fluorescence of the solution is measured with a fluorimeter. For soil extracts, direct u.v. spectrophotometry is used, the strong absorption of the aqueous solution being measured at 225 mu.

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### LABORATORY CHEMICALS

(Continued from page 153)

or inflammable nature of the compound, its storage in containers suitable for despatch to any part of the world, and its price have next to be considered.

Customers should place orders well in advance of estimated dates of actual use and quote from the supplier's catalogue.

#### Discussion

Dr. R. E. Bowman criticised the delay in the introduction of new laboratory chemicals and asked if it was the policy of the suppliers to wait for a demand. In reply Mr. Hammer said that this depended upon the policy of the individual company. Organic chemicals were costly to make, and in general some indication of a demand was required before suppliers were prepared to introduce a new product. Sometimes new products were developed in the supplier's own research departments.

Mr. W. C. Johnson (Hopkin and Williams Ltd.) said that his firm occasionally made a new substance first, but usually it was not until enquiries for it had been received. He suggested that if a chemist developed a new analytical procedure he should notify manufacturers of the new analytical reagents required. Variations in demand for reagents occurred and he instanced the use of dithiol for the determination of tin which became established in this country in 1925 but which has been little used in the U.S.A. until recently.

Mr. R. O. Atkinson raised the question of the labelling of chemicals and described a case in which the labels on a product achieved their purpose to such an extent that the staff were afraid to open the container. Mr. Hammer said the Poisons Rules were not sufficiently complete, for such a highly toxic substance as dimethyl sulphate was not included.

In reply to Dr. J. H. Wilkinson the lecturer said it was not feasible to publish lists of research intermediates and enquiries should be made for any particular substance required. Dr. Barber also pointed out that the quality of such substances would be variable, that once a sale had been effected the material would not be available, and there was also the possibility that the research people themselves may have used or discarded it.

# The New B.P.—A Book of Contrasts

By S. J. Hopkins, F.P.S.

The 1958 British Pharmacopæia,\* which becomes official in September, is the centenary edition of this famous book in that it was in 1858 that the first Medical Act was passed which placed upon the General Medical Council a number of duties, including the publication and revision of the B.P. The first B.P. appeared in 1864 and there have been eight since. It is now revised and published every five years.

THIS edition of the B.P. perhaps more than any other is a book of contrasts, as drugs of historical antiquity and products of the nuclear age are described with equal clarity. The inclusion of sodium radio-iodide and radiophosphate, which now come within the orbit of the pharmacist for the first time, is indicative of the wide range of the book and makes it a landmark in the history of pharmacy.

The Pharmacopæia now has 826 monographs, of which 160 are new to this edition. These additions offer some surprises, as it is difficult to realise that only in this edition have established drugs like amylobutobarbitone and achieved the respectability of official status. Other additions reflect advances in therapeutics as well as changes in formulation. sodium radio-iodide is used in the diagnosis and treatment of thyroid disorders and the radiophosphate in determining the position of various tumours. New antibiotics are represented by phenoxymethyl penicillin, erythromycin, tetracycline, bacitracin, neomycin and polymyxin B. Sulphonamides include phthalylsulphathiazole, one of the most effective of the sulphonamides used for intestinal infections, and sulphamerazine. In view of the fatal anuria that has been reported following the use of this drug, its inclusion in the present edition of the B.P. is not easy to understand. Mannitol is described, as it is the new base for glyceryl trinitrate tablets, and the newer steroids are represented by both prednisolone and prednisone and their acetates. Other less familiar additions include drugs used almost exclusively in the treatment of tropical diseases.

The list of deletions is long, comprising over 130 items, and includes such time-honoured drugs as arsenic, cloves, quassia, aromatic powder of chalk and belladonna root. Many drugs are deleted on grounds of therapeutic inadequacy; others, such as phenylbutazone, are more surprising. Friars' balsam still keeps its place, and with it the monographs on its constituents. It is not easy to understand why the Pharmacopæia retains this hoary galenical. Others of equally ancient origin and possibly of greater therapeutic value have long since disappeared from the pages of the B.P., and sentiment alone hardly justifies its retention.

In most other respects the book everywhere bears evidence of a thorough revision. The English nomenclature has been extended, and the opportunity has been taken to introduce less cumbersome titles for some official preparations. Thus propantheline tablets, the official exemplar of a group of drugs of increasing importance, are described under that title, and details of the salt employed are given in the monograph. Abbreviated or full Latin titles are given only when they show any significant differences from the standard English titles, as in Ung: Hydrarg: Ammon: (Ammoniated Mercury Ointment). Hydrous Ointment and Simple Ointment now become Oily Cream and Aqueous Cream, and Calcium Chloride refers to the hydrated form of the salt. The change from Exsiccated Ferrous Sulphate to Dried Ferrous Sulphate is less welcome. The titles of various biological products have also been revised, Tetanus Toxoid becoming Tetanus Vaccine. A systematic arrangement of abbreviated titles for immunological products is also included.

A valuable innovation is the inclusion of a general monograph on injections, where basic information on sterilisation, containers, caps, etc., is summarised. A warning is given that multiple-dose containers should not contain an excessive

number of doses, but no guidance is given upon what constitutes an excess. The B.P., recognising the danger, might well have been more explicit on this point.

The statements of doses have been revised and extended and the amounts expressed almost entirely in the metric system. The Imperial system is retained for the dwindling number of older drugs that are still commonly prescribed in doses expressed in that system, but it is evidently the intention to omit the Imperial system altogether in the next edition.

The Pharmacopæia also reflects in its assay processes some of the developments in analytical chemistry. Electrometric determination of end-points is used in a number of titration procedures, as in the assay of the sulphonamides, and in other cases titration in non-aqueous solution is employed. The use of spectrophotometric methods has also been extended, as this offers the most satisfactory means of assaying steroids and their preparations, particularly when the amount of sample is small.

The appendices form an increasing part of the Pharmacopœia, and give details of a diverse range of assay procedures. Of particular value is a clear description of biological assays and tests. This appendix discusses the design of such assays and their limitations, and its usefulness is increased by notes on methods of calculating results, together with examples. Not the least valuable part of this appendix is the table of Standard Preparations Units, and corresponding weights.

The disintegration test for tablets has been extended to cover enteric coated tablets, and a table is given indicating the diameter of the official tablets. The final appendix is a list of seven local anæsthetics, indicating the strengths employed for spinal block, nerve block, infiltration and topical anæsthesia.

<sup>\*</sup> Pharmaceutical Press, pp. 1012. 63s. (Postage 2s. 3d. inland, 4s. overseas.)

# PLANT AND EQUIPMENT

#### Automatic Control of Toilet Preparations Manufacture

A batch manufacturing cycle, previously controlled by a skilled operator, has been converted to fully automatic operation by County Laboratories Ltd.

An automatic programme controller designed and built by Venner Ltd. controls each stage of the process which involves the introduction of liquid and semi-liquid ingredients into a large batch mixing vessel. This vessel also requires strict control of its jacket at varying

temperatures.

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Following an analysis of the operations required at each point in the time cycle, a 22 bank cam controller was designed, driven by a synchronous motor, geared to give one rev. per batch cycle. Low voltage contacts are opened and closed on each cam position dependent on the pre-arranged programme setting. The signal from each set of cam contacts is fed to a low voltage relay whose contacts control the mains feed to motor starters, pumps, mechanised valves, etc. These units in turn control the transfer of ingredients to the mixing vessel, together with the steam and other services associated with the manufacturing plant.

To enable the plant supervisor to have a visual picture of the process at all times during the manufacturing cycle, a series of low voltage red and green lamps is mounted in the front of the control panel but behind a ground glass screen. These lamps are spaced across the screen in accordance with the time scale of the process; while at the top of the screen is an illuminated time scale traversed by the shadow of a cursor driven by a Venner synchronous clock movement. The lamps, which change from red to green when an operation is in progress, are controlled by contacts on the motor starters or electrically operated valves controlled by the cam con-This ensures that the lamps will only change colour when the operation called for by the programme controller has actually taken place.

Provision is also made whereby any particular operation of the manufacturing cycle can be omitted or controlled manually if desired,



Automatic programme controller for batch manufacture of toilet preparations.

while still retaining automatic control upon the remainder of the batch cycle operation. The same features enable rapid fault finding or routine service checks on the operation of particular valves, pumps or motors to be carried out without the need to operate the plant through the entire batch cycle time.

Facilities are incorporated which automatically shut down the plant in the event of fault conditions developing. Should this occur, all valves will automatically be returned to the closed or safe position, pumps are stopped and mixers brought to rest. Interlocks also prevent the programme controller starting its cycle if initial temperatures of vessels or ingredients are incorrect.

#### **Dust Collector Without Moving Parts**

The new Mikro-Pulsaire dust collector is an American machine which is now manufactured under licence in this country and marketed by Pulverising Machinery Ltd.

The main advantage of this collector is stated to be the absence of internal moving parts. It uses a method of continuous air filtering of powder and dusts which dispenses with the need for mechanical systems of filter cleaning.

In principle the dust-carrying air

passes into cylindrical filter elements composed of woollen and synthetic felts, 4 ft. or 6 ft. long, leaving the dust to fall from their external surfaces to be collected at the bottom of the pressure cabinet.

The problem in previous designs, say the manufacturers, was to clear the thick layers of dust from the filter cloths covering the cylinders to enable the collector to work efficiently. The Pulsaire clears the cloths by periodical high-pressure air currents in the reverse direction to the filter flow-from inside the Above the opening in cylinders. the head of each cylinder is a nozzle connected to a compressed air supply of 60-lb./p.s.i. through a solenoid control valve. An electrical timer opens each valve in sequence for whatever period and frequency is desired—for instance, 0.1 sec. every 10 sec.

The contoured design of the cylinder openings brings about Venturi action and induces a secondary flow of sufficient volume and pressure to clear the filter cloths against the filter flow pressure. The dust adhering to the outside of the filters is blown away before it is thick enough to impede the rate of collection.

The Pulsaire system requires practically no maintenance, according to the manufacturers. They say that the employment of compressed air instead of mechanically moving parts—shakers or blow rings with their attendant chains, sprockets and bearings—enables the unit to operate for long periods without attention.

In one field test on ground gypsum dust it is reported that the Mikro-Pulsaire unit ran for nearly 3,000 hr. without a single failure, and in over five months it has received no maintenance, although working 24 hr. a day, six days a week. Abrasive and toxic dusts are said to present no particular difficulty, the former because there are no moving parts to be damaged, and the latter because the cabinet seldom needs to be opened for inspection.

Because of its simplified principle of operation, it is claimed that the initial and installation costs of the Pulsaire compares favourably with machines having the same output using mechanical clearing systems.

It is a compact machine requiring the minimum of space.

The manufacturers state that one of the problems they are tackling at present is to find a suitable filter medium to withstand temperatures up to and around 1,000°C. There are also plans for the development of a pneumatic timing device to control the duration of the reverse air jet.

#### Screen Printer for Containers

The Dawson 3-Way is said to be only silk screen printing machine which will print three different ways in one unit. The manufacturers, Dawson Bros., say that it will print on round, tapered, square or flat surfaces. In round printing the screen moves backwards and forwards over the objects being printed while the squeegee remains stationary, lightly touching In square and flat the screen. printing the squeegee moves backwards and forwards pressing lightly on the stationary screen. Adjustment from one printing operation to another is said to be a simple process taking only a few minutes.

Single or multi colours can be printed on almost any material. The silk screen can be either stencil cut or photographically prepared. Very fine detail can be printed: it is claimed that the smallest newspaper type will come out sharp and clear.

Semi-permanent all-purpose inks, Pyroglaze, are available for use with the 3-way machine. According to Dawson Bros. these have an opacity and permanency almost equal to ceramic colour, and they adhere well to any rigid surfaces. They are resistant to most acids and alkalis used in washing solutions and will withstand prolonged immersion. When used on outdoor signs, any dirt which gathers can be removed in a caustic solution, without danger to the colour. When used on bottles, tumblers, etc., the Pyroglaze inks require only 5 or 6 min. curing time. This is for the colour itself. For this purpose Dawson Bros. have available a drying unit which, they say, eliminates the need for costly lehrs, curing furnaces or ovens.

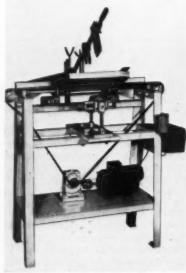
#### X-Ray Spectrometer

The Solartron automatic X-ray spectrometer is used for the quantitative and qualitative analysis of solids, liquids and gases. The analysis is made by means of the identification and measurement of the intensity of spectrum lines reradiated from samples subjected to



Automatic X-Ray spectrometer for quantitative and qualitative analysis of solids, liquids and gases.

a continuous X-ray spectrum directed from an X-ray tube. The process is automatic and the results may be presented graphically on a pen recorder or automatically printed out on a tabulating machine. A very small specimen or sample only is required and no special treatment of it is necessary.



"Three way" screen printer for round, square or flat surfaces.

#### Tailor-made Tanks

A "made-to-measure" service for users of process and storage tanks has been introduced by Premier Colloid Mills Ltd. The cost is not much greater than the standard product and delivery can be made in some cases within 10 days. The tanks range in size to 100,000 gal., and can be stainless-steel, jacketed, or with dished bases, as required.

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Delivery of the larger and more complicated types may take a little longer than for the straightforward storage and mixing tanks of 200 to 300 gal. The tanks can be used with any mixer.

#### ASPIRIN IN DIABETES

The use of aspirin for the treatment of diabetes is being considered as the result of recent findings at the Clinical Chemotherapeutic Research Unit of the Medical Research Council, Western Infirmary, Glasgow, it is reported in the B.M.J., 1957, (5053), 1071.

Seven mild to moderately severe diabetic patients were studied. Apart from being placed on a lowcarbohydrate diet, aspirin was the only medicament administered.

At the end of two weeks glycosuria was abolished in each case and the fasting blood sugar was brought to normal or near normal. Relative symptoms such as thirst, polyuria and pruritus were completely relieved. Moderate ketonuria in two cases was reduced to normal.

While no decisive effect on glucose tolerance was obtained the blood-sugar curves were always lower during aspirin administration.

While serious toxic manifestations were not conspicuous, tinnitus and deafness were annoying; these symptoms disappeared shortly after aspirin was discontinued.

In the oral treatment of diabetes aspirin has an obvious advantage over the sulphonylureas in that it may be given for prolonged periods without risk of agranulocytosis. In addition maximum tolerated doses such as were given during the test period lowered the fasting blood sugar level to normal without inducing hypoglycaemia.

The action of aspirin in diabetes mellitus has been located in the tissues, and this is thought to be of interest in the light of the proper establishment of the drug as a peripheral acting metabolic stimulant.

# BOOK REVIEWS

### The Chemistry of Organic Medicinal Products

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By G. L. Jenkins, W. H. Hartung, E. Hamlin Jr., J. B. Data. J. Wiley, New York, Chapman and Hall, London. x+569 pp. 86s. net.

To HAVE attained a fourth edition is a guarantee of success, and this book is no exception. In its revised and largely rewritten form it presents a good survey of the chemistry of some four thousand compounds in a somewhat encyclopædic form; it may be considered largely as a compendium of factual knowledge about organic compounds of biological significance. This leads to entries such as: "Methoxsalen N.N R.  $\delta$ -lactone of  $\beta$ -(6-hydroxy-7 - methoxybenzofuranyl) acrylic acid is used in the treatment of idiopathic vitiligo; it increases production of the melanin pigments in the skin on exposure to ultraviolet light."

I have quoted this typical example to indicate that the emphasis of this work is towards the use of the substance rather than to its chemistry. If one takes p. 403, for example, dealing with such important drugs as nirvanol, dilantin, phenantoin, thiantoin, the whole space is devoted to applications rather than to chemistry. That this policy has produced a useful book there is no doubt and it can be confidently recommended as a desk-volume for continual handy reference.

It is a matter of surprise to this reviewer that in a book weighted towards applications rather than chemistry, the authors should have retained the arrangement according chemical subdivisions. makes for some strange bedfellows in one section we meet allantoin as a cell-proliferant, biotin as a food accessory factor, arfonad as a hypertensive agent, pesomin as an appetite depressant and the hydantoin hypnotics all in two and a half pages; in a subsequent edition it would surely make for a more useful picture if these were sorted out into generic subdivisions according to physiological activity.

The book is well produced with plenty of illustrative structural formulæ and is relatively free from misprints; its price is somewhat **Bookshop Service** 

All books reviewed in Manu-FACTURING CHEMIST and all other scientific or technical books may be obtained from:

Technical Books, 308, Euston Road, London, N.W.1. Telephone: Euston 5911. Prompt attention is given to all orders.

high, but it is to be hoped that this will not preclude its use as a personal general reference work.

G. M. Dyson.

Bergey's Manual

of Determinative Bacteriology, 7th Edn. 1957. Baillière, Tindall and Cox. Pp. 1094. 120s. net.

The first edition of Bergey's Manual appeared in 1923, and arose from the efforts made by the Society of American Bacteriologists to evolve a satisfactory system for the classification of bacteria. The science of bacteriology is a very young one, and its taxonomy is constantly changing as knowledge accumulates: so that later editions of the Manual became progressively larger and more complicated, the sixth edition of 1948 containing 1,529 pages.

1,529 pages.

"Bergey," named after its original editor, is a reference book indispensable to every bacteriologist—whether or not he approves of its taxonomic arrangement—because it represents the *only* available source book for full descriptions of the morphological and biochemical characteristics of some 2,000 accepted species of bacteria, together with references to original publications relating to them.

The present edition contains the co-ordinated efforts of a hundred specialist contributors, the editor-in-chief being the late Dr. R. S. Breed. The size has been reduced to a mere 1,094 pages by the expedient of omitting certain sections and transferring others to a separate volume which will be published shortly.

Among material omitted is the long historical review of bacterial taxonomy (which can always be consulted in an earlier edition);

and the experimental classification of viruses, which was not too well received, has been dropped for the present. Transferred to the separate volume, to be called Index Bergeyana, are the uncertain and poorly described species previously listed as appendices, and the "host and habitat" index that appeared first in the 1948 edition. records have been included, so that the new edition, though smaller and more convenient to handle than the last, actually describes a larger number of accepted species.

Few biologists nowadays have a working knowledge of Latin and Greek, and the insertion of etymological notes on all generic and specific names is a feature of this edition that will be appreciated.

To the taxonomist the chief feature of each new edition of Bergey is the rearrangement and splitting of groups aiming at a closer approximation to a "natural" classification. Recent changes are too numerous to be discussed here, but one notes an increased emphasis on the nature of flagella formation; this may or may not be a sound criterion for classification, but it is certainly a very inconvenient one.

The industrial bacteriologist is more concerned with the Manual as a reference book, e.g. he may wish to ascertain if Bact. aerogenes will ferment glycerol: the optimum temperature for sulphate reduction; or simply whether Lamprocystis is a bacterium or a shell fish. With the aid of the Keys provided, added to experienced judgment and a very considerable slice of luck, he may occasionally succeed in identifying an unknown isolation. Pathogenic bacteria represent a small proportion of the total number; of these the industrialist is mainly interested in food poisoning types, and the species used in various special tests of disinfectants, antibiotics and pharmaceuticals.

The microbiologist engaged in industry may be content to continue with his well-thumbed copy of the sixth edition for a little longer, or he may care to invest in the new model. But if he is not already a convert, the invaluable nature of "Bergey" should at once be brought to his notice.

L. D. GALLOWAY.

# NOTES AND NOTIONS

#### TRIUMPHANT BLUNDERS

THERE IS much to be said for the ability to turn setbacks into advantages, but even so the public's jaw must have sagged at the bland official reaction to the accidental dropping of an H-bomb in South Carolina. This dreadful and sinister mishap was described by a Government spokesman as proof of the oft-proclaimed assertion that unprimed nuclear bombs could not explode. So persuasively was this put over that people could be excused for believing that it was not an accident at all but a deliberate exercise to test a scientific theory. It is like a surgeon telling a man whose lung he has accidentally cut out that the mistake proves that people can live with one lung. If it is necessary to prove theories in this disastrous way most people would prefer them to remain unproved.

The art of making the best of a bad job is not confined to the Americans. A few months ago there was a fire at Windscale which destroyed a valuable nuclear plant and about 3 tons of uranium and which released radioactivity over such a wide area that all milk from that area had to be dumped, involving a bill of £70,000 for compensation for farmers. The total cost of the accident amounted to hundreds of thousands of pounds. It was a major disaster. Now we are told that it has aided the development of nuclear science and once again the impression is being given that a plain accident is really a scientific achievement.

Admittedly both the South Carolina and the Windscale disasters were in the realm of nuclear energy, a new science about which a great deal remains to be learned. both involved public money and, basically, human miscalculations. If it had been private capital and private enterprise would the same room for errors have been left? The problem of accountability for the spending of gigantic sums of public money on essentially industrial projects remains to be solved, if indeed it is soluble. Meanwhile it is proper to assert that these were bad and costly mistakes and that there is nothing new or wonderful in people learning from mistakes. That is the common experience of every human being, from the cradle to the grave.

SEASIDE PRACTICE

ONE RESULT of the agglomeration of society into various pressure groups, each trying to secure more and more for its members, is that it is much less difficult than formerly to attribute mercenary motives to doctors. Even so it is seldom that I have seen such refreshingly frank observations on his trade by a doctor as those which appear in the new issue of the Glaxo Volume. This article, like most non-professional writings by doctors, is anonymous. All that is revealed is that the writer has forsaken foggy London for a South Coast town from which occurs each day a flight of "males and unpaired females travelling tightly packed together in great long flocks, leaving the coast like gulls for inland working and feeding grounds early each morning, only to return to sleep and breed at nightfall." Perhaps it is as well that the article is anonymous, otherwise the purveyor of this scalpel-like humour might find the "gulls" migrating from his surgery.

Not that he makes all his money from the natives. He, like the hoteliers and the boarding house ladies, reaps his harvest from the He quotes a hotelier complaining about the winter trade, or lack of it. "Of course what we need is a really good flu year in London." In this event, he observes, "The hotel doctor benefits too, because not infrequently the convalescent patient relapses and requires medical help. Sometimes this possibility is foreseen by the patient's home doctor, who naturally reciprocates when the invalid returns: indeed in this way many an old friendship has been kept going."

One complaint of the hotel doctor is the increase in night work caused by big conferences. "Old trade friends gather together, often without the steadying influence of their wives, and the resulting evening parties may even once a while end in disaster for one of their number and an emergency call for the doctor. Broken bones, apoplexy, fits and driving under the influence of drink are recurring features on these occasions. Those who avoid such celebrations still seem to run into trouble. The vital speech is concluded and the speaker's sudden coronary thrombosis rings down

the final curtain. Conferences truly bring good out-of-season trade and are welcomed by the town."

Yes, it's an ill wind that blows nobody any good. The salty breeze may give you twinges and the lavish holiday fare indigestion and worse. Be consoled by the thought of the business you are bringing to the seaside doctor and hope there is no profit in it for the seaside undertaker.

#### LUMINOUS ROADS

A HOARY BUT none-the-less valid criticism of motor-car manufacturers is that they seem to spend more time on trivialities like colour and decoration than on engineering improvements; even such a badlyneeded convenience as one-shot chassis lubrication is still available only on expensive cars. Lighting is another problem. A few years ago a device called the "Autronic eye" was invented; placed on the front of the car, it dipped the headlights on being excited by the lights of an oncoming car. That was a nice piece of photoelectric courtesy, but what is really needed is a device that dips the headlights of oncoming cars.

Good road lighting is the answer to the headlight hazard. A fascinating proposal has been put forward in Analytical Chemistry by Ralph H. Muller. "Why not illuminate the vehicle itself by softly luminous plastic bodies? Fluorescent markers have been a tremendous boon, but why not extend the principle? Is it impossible to incorporate millions of cheap fluorescent buttons in concrete or macadam?"

How would these markers be activated? Here again Mr. Muller is not lost for an answer. Why not fix ultraviolet lamps beneath cars or make use of the appreciable static charges developed by every rubber-tyred moving vehicle? Hc concludes: "A great deal is known about the excitation of phosphors and their decay constants. An automatic count of traffic on a specified highway could furnish the data for the number, nature and disposition of phosphorescent markers and their frequency of illumination by passing cars to maintain an acceptable level of soft illumination."

Cicerone

# News..

# Inauguration of new Lederle factory

THE NEW factory at Gosport, Hants, built by Cyanamid for its Lederle Laboratories Division, is to be officially inaugurated on April 15. The inaugural speech is to be made by Sir Alexander Todd, Professor of Organic Chemistry at Cambridge, before 200 guests at a luncheon in the factory. Other speakers will be Mr. O. N. Williams, managing director of Cyanamid of Great Britain Ltd., and Mr. Kenneth Towe, chairman of the Cyanamid organisation.

As reported in our December issue, the new factory is for the manufacture of

Aureomycin, Achromycin and other pharmaceuticals.

The factory employs nearly 300 people. It provides high standards of hygiene and atmospheric and humidity control. For example, all air conditioning duct work and piping for steam, water, and electric power and other services for the pharmaceutical section are installed above a suspended ceiling, so providing easy cess for maintenance and alteration.

Every inch of factory space, containing the latest equipment, fits neatly into the production pattern, streamlining all stages of manufacture from the receipt

of raw materials to the despatch of finished products.

Surrounded by spacious lawns, the plant was designed to blend with its natural

surroundings—the restful background of the Hampshire countryside.

The inauguration of the factory marks an important development in the growth of the British Cyanamid organisation, which has been operating here for more than 30 years. The factory replaces premises at Hirwaun, South Wales, a building which was taken over and adapted for the manufacture of Lederle products

#### More tax-free drugs

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Purchase Tax (No. 1) Order, 1958, makes more drugs and medicines exempt from Purchase Tax. drugs and medicines previously exempt remain exempt under the new Order but certain of the drugs now appear under the name approved by the British Pharmacopæia Commission.

Items which join the tax-free list are:

#### Under Head II of the Schedule

Aluminium dimagnesium trisilicate, whether or not mixed with hyoseyamine, hyoseine, apo-atropine and belladonnine;

p · n · Butylaminobenzoic (nona · ethyleneglycol methyl ether) ester:

The molecular compound of chloral hydrate and enazone:

5 · Chloro · 2 · (p · diethylaminoethoxyphenyl) · benzothiazole hydrochloride;

Chlorothiazide; Dihydroxyaluminium sodium carbonate, whether or not mixed with calcium carbonate; N-Ethyl-N'-(5-nitro-2-thiazolyl)urea;

The entry for hormones and synthetic compounds with hormone activity which appeared in the Purchase Tax (No. 2) Order 1957 is extended to include the carbon ring system of ostr-5(10)-

Mannomustine, and salts thereof; Narcotine, and salts thereof.

#### Under Head III of the Schedule

1 - (2 - Hydroxyethyl] - 4 - [3 - (2 - chloro - 10 - phenothiazinyl)-propyl] piperazine, and salts

N-Methylpipecolin-2;6-xylidide hydrochloride; Vanilloyldiethylamide.

### I.C.I.'s sales reach £463 m.

I.C.I.'s turnover last year increased by £28 million over 1956 to £463 million. From the Group's income of £55,135,296 tax took £26,328,078. I.C.I.'s income after tax was £22,141,794, less than £3 million more than in 1956.

In the accounts nearly £5 million has been allocated to the employees'

profit-sharing scheme. Ordinary dividend is up by 2% to 12% less tax.

The 31st AGM will be held on May 15 when a resolution will be submitted to capitalise over £72 million of reserves to be applied in a scrip issue to Ordinary stockholders at the rate of one new Ordinary share of £1 to each £2 held. Treasury consent has been granted.

#### Supplies for Kashmir Mountaineering Expedition

The medical requirements of the Minapin (Karakoram) Expedition, 1958, have been specially packed by Evans Medical Supplies Ltd., Speke, Liverpool.

Minapin Mountain, 23,650 ft., is in Kashmir and is so far unconquered by man. The expedition hopes to be the

first to climb it.

The medical supplies have been carefully selected and packed to render them water- and insect-proof. Evans Medical have a great fund of experience to draw on in this connection, having provided the medical equipment for the Trans-Antarctic Expedition, 1955-8, as well as for other mountaineering expeditions.

One of the many problems which the expedition will encounter is the cough caused by the dry atmosphere, which afflicts men at high altitudes. combat this, Coscopin, a new cough suppressant containing noscapine, has been included in the equipment.

The Expedition's Medical Officer is Mr. F. C. Hoyte, M.B., B.S., F.R.C.S., who is Surgical Registrar at Aintree

Hospital, Liverpool.

The main party left Liverpool on March 29 on the R.M.S. Cilicia.

#### Mr. Tom Williams will open Pesticides Exhibition

The Right Hon. Tom Williams, P.C., LL.D., M.P., has consented to perform the official opening of the Crop Protection and Pest Control Exhibition at 3 p.m., Monday, May 12, in the Royal Horticultural Society's New Hall, Greycoat Street, Westminster, S.W.1.

Mr. Williams has sat in the House of Commons as the Member for the Don Valley for 35 years. His official connection with agriculture began in 1924, when he was appointed Parliamentary Private Secretary to the Minister of Agriculture in the first Labour Government.

In 1940 he was appointed Parliamentary Secretary to the Minister of Agriculture in the National Government and served in this post until the end of the war.

When the Labour Party gained power in 1945, Mr. Williams became Minister of Agriculture and served in this office for six years, until 1951. The Exhibition will feature the

latest chemical methods of pest control. It will run from May 12 to May 15.

The organisers are World Crops and complimentary admission tickets are available from the organiser, Leonard Hill House, Eden St., London, N.W.1.

#### Monsanto's record exports-41% of sales

Although Monsanto Chemical's turnover in 1957 was 113% up on the previous year—amounting to £15.89 million—net profit after tax of £864,374 was only  $3\frac{1}{2}\%$  up on 1956. This was due to higher taxation, partly brought about by the suspension of investment allowances.

Export sales remained high at £6.4 million, representing no less than 41% of all sales. Volume output of the Ruabon and Newport factories

was up by 11½% over 1956.
These figures were given by the chairman, Sir Miles Thomas, in his annual review. The firm's chemical division sales, he said, made new records. Demand for fine chemicals was continually increasing and, for instance, sales of aspirin and phenacetin were at capacity levels. Production of cyclohexylamine and dicyclohexylamine began at Newport last year and sales exceeded targets. Plastics division sales were good.

New enterprises include the building of a polyethylene plant at Fawley which is expected to be ready some time this year. Several further projects at Fawley are being examined.

New products emerging during the year included a polymeric viscosity index improver for lubricating oil, a new range of gear oil additives, co-polymer latices for surface coatings, and tough styrene co-polymers.

#### New laboratories

Borax Consolidated Ltd. are having laboratories and offices built on a site at Cox Lane and Mount Road, Surbiton, Surrey.

#### Allenbury's new project

Allen and Hanburys Ltd. are planning to build a factory at Burbeck Street, London, E.2.

#### **Extensions to Morson factory**

Thomas Morson and Son Ltd., fine chemical manufacturers, are having a single-storey extension built at Summerfield Works, Wharf Road, Enfield, Middx.

#### Greeff's Birmingham office

R. W. Greeff and Co. Ltd. have opened a branch office at 7 Swan Buildings, 113 Edmund Street, Birmingham 3. It will be under the management of Mr. L. V. Jennings, the company's representative in the Midlands.

#### Gibberellic acid-I.C.I.'s policy

Pure gibberellic acid, a plant growth regulating substance, was first isolated in 1954 in the Akers Laboratories of Imperial Chemical Industries Ltd. Since then, I.C.I. and Plant Protection Ltd. have conducted a programme of fundamental and field experiments with the chemical, and Plant Protection Ltd. have become responsible for the technical and commercial development of gibberellic acid, which is produced by the Pharmaceuticals Division of I.C.I.

Plant Protection Ltd. are awaiting the necessary technical information concerning the practical utility of gibberellic acid on agricultural, horticultural and flower crops and until this information is available they do not wish to launch the product on their sales range. This is in accordance with their policy which is to accompany all range products with detailed recommendations as to their use. Although work by the I.C.I. Industrial hygiene research laboratories has shown the chemical to be of very low toxicity, Plant Protection Ltd. do not at present recommend its use on edible crops destined for sale.

In the meantime, a liquid formulation containing a concentration of 4,000 p.p.m. of gibberellic acid is available from Plant Protection Ltd., without specific recommendations for use. The material is obtainable in the following sizes:

250 c.c. bottle .. .. price £6 25 c.c. bottle .. .. price 12s.

Enquiries for material should be addressed to Plant Protection Ltd., Bolton House, 61 Curzon Street, London, W.1.



Two long-service members of the staff of Evans Chemicals Ltd. have been admitted to the company of the company of the company chairman, presents them with silver powder compacts. A further three eligible members who were unable to attend because of illness received presents at a later date. The club has 28 members.

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### Desiccant agency

K. W. Chemicals Ltd., London, have been appointed exclusive concessionaires in the U.K. for Drierite, an all-purpose desiceant for solids, liquids and gases. It is manufactured by W. A. Hammond Drierite Co. of Ohio, U.S.A., in association with Spett. Ing. G. and A. Punzi of Italy.

#### A London office

London office facilities are part of the services offered to industry by a new company, Industrial Associates Ltd., 64-6 Oxford Street, W.I. The firm offer, inter alia, the use of their address and telephone number, office accommodation including secretarial staff, and representation in the south of England. Fees are scaled to the facilities required.

# The organisation of chemical engineering projects

Since the end of the war a large amount of new plant for manufacturing chemicals, including petroleum products and derivatives, has been installed in Great Britain. The Institution of Chemical Engineers and the Institute of Petroleum are arranging for the presentation of a number of papers on the design and installation of this type of plant. They will be given at meetings to be held at Olympia, London, on June 24, 25 and 26, during the Chemical and Petroleum Exhibition.

The Symposium has been divided into seven parts:

- (a) Design data and Specification of Requirements, including site selection
- (b) System of Project Organisation
- (c) Functions of the Contractor(d) Programming and Progressing Systems and Meeting Completion
- (e) Cost Estimating and Control
- (f) Plant Commissioning
- (g) The Analysis and Future Use of Project Records.

In general two papers, by different

authors, will be given on each of these parts. Except in the case of (c) one of the papers in each part will be given by a member of an industrial chemical manufacturing firm, and the other by a member of an industrial contracting firm.

The registration fee for the Symposium will be £2 for members of the Institution of Chemical Engineers, members of the Institute of Petroleum and members of the Constituent Bodies of the European Federation of Chemical Engineering. The fee for others will be £3. Preprints will be supplied free to those registering.

Enquiries should be addressed to the General Secretary, the Institution of Chemical Engineers, 16 Belgrave Square, London, S.W.1.

#### New acid plant

Chemical Construction (Great Britain) Ltd., have received a further contract from British Titan Products Co. Ltd. for a 250 tons per day contact sulphuric acid plant to be erected at Billingham. This is the fifth sulphuric acid plant which the company have supplied to British Titan Products.

# Laporte acquires Canadian company

Laporte Industries Ltd. has acquired a majority interest in Pembina Mountain Clays Ltd. of 945 Logan Avenue, Winnipeg, Canada.

This company has similar interests to the Fullers' Earth Union, Ltd., a United Kingdom subsidiary company of Laporte Industries Ltd.

#### Cheaper chemical glassware

A new price list issued by Quickfit and Quartz Ltd. shows that some items are cheaper.

An example is the B19 cone which formerly cost 2s. 9d. plus 5% and now quoted at 2s. 6d., only 3d. more than the pre-war price. Liebig condensers, previously 20s. plus 5%, are reduced to 18s., which is only 4s. 6d. more than pre-war.

## People

Mr. N. M. Peech has been appointed a director of Albright and Wilson Ltd. He is chairman and managing director of the Steetley Co. Ltd., and has been a treasury nominee on the board of Albright and Wilson's subsidiary company, Solway Chemicals Ltd., since 1952.

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Mr. H. G. Frampton, director in charge of buying at Chesebrough-Pond's Ltd., of Willesden, has retired after 43 years continuous service. He began as an office boy in 1915 at the London offices of Chesebrough Mfg. Co. Consd., when it was a branch of the parent American company.

Mr. A. J. C. Gormley, chairman, has appointed Mr. Peter Keddie, F.P.S., as managing director of John Wyeth and Brother Ltd. Mr. Keddie had been assistant managing director (Home) and a member of the board since 1952. As part of their rapid expansion and development programme Wyeth have recently opened new research laboratories and factory at Havant, Hants. Mr. M. H. M. Arnold, F.R.I.C.,

Mr. M. H. M. Arnold, F.R.I.C., A.M.I.CHEM.E., has been appointed the technical director of Bowmans Chemicals Ltd.

Mr. R. H. Macnab, head of the Veterinary Division of Smith Kline and French Laboratories Ltd., attended the second symposium on the Nitrofurans, held at the University of Georgia, U.S.A., in March. Mr. Macnab also studied field trials of new products being developed to combat animal diseases.

Dr. Kenneth Carter has been elected to the newly-created post of vice-president-research and medical affairs, of Ames Co. Inc., Elkhart, Indiana. He has also been elected to the board. Dr. Carter joined Ames in February 1957, when he moved his family from England, where he was medical director and director of development research of Smith Kline and French International Co.

Mr. George West, assistant export manager of the Chemicals Division of Newton Chambers and Co. Ltd., Thorncliffe, near Sheffield, has just returned from a 25,000-miles business tour of Commonwealth countries and the Far East.

He visited 23 countries, calling on agents in countries where Izal products are already extensively used, and investigated conditions and prospects in other areas where developments are taking place. Mr. West is the son of Sir Harold West, former managing director of Newton Chambers.

Mr. Ralph Estill Huffam has been appointed a director of Griffiths Hughes Proprietaries Ltd., and of E. Griffiths Hughes Ltd., its operating company.

Mr. D. C. Lee, B.SC., F.R.I.C. has retired from the consulting practice





M. A. T. Rogers.

H. G. Frampton.

of George Lewi and Partners to join Abbott Laboratories Ltd. The practice continues under the direction of Mr. T. D. O'Keeffe, M.A.

Dr. A. F. Ross, B.SC., M.B., CH.B., has been appointed research liaison officer at Smith and Nephew Pharmaceuticals Ltd.

Immediately before joining the company Dr. Ross, who is 37, was in general practice. He was assistant lecturer in physiology at Guy's Hospital Medical School from 1948 to 1953, during which period he gained a B.M.A. research scholarship for work on cerebral circulation, and from 1954 until 1957 was medical officer to Sierra Leone Development Co. Ltd.

Dr. M. A. T. Rogers has been appointed Research Controller of Imperial Chemical Industries Ltd. He succeeds Mr. R. M. Winter who has retired from the Company after 30 years' service.

Dr. Rogers was born at Mill Hill in 1911, and received both his B.Sc. and Ph.D. from University College, London. He joined the Dyestuffs Division of I.C.I. as a chemist in 1934, and served in the Azo Section until 1936, the Textile Auxiliary Section until 1939 and the Exploratory Research Section until 1942. In that year he joined the Royal Artillery, and when he returned from his military service, he became engaged on penicillin research with Sir Robert Robinson at the Dyson Perrins Laboratory, Oxford. In 1946, Dr. Rogers joined the medicinal research division of Dyestuffs Division, and in 1949 he became Head of the Academic Relations Department of that Division.

Mr. Winter was born in Scotland in 1896 and emigrated in early childhood to New Zealand where he received most of his formal education. On graduating B.Sc. in 1916 he volunteered for military service and served with the New Zealand Division in France where he was wounded. He joined Synthetic Ammonia and Nitrates Ltd. (now the Billingham Division of I.C.I.) early in 1928 and was transferred to the I.C.I. General Chemicals Division as Research Manager in 1931. In 1937 he moved to





A. F. Ross.

R. H. Macnab.

Head Office as chief assistant to Dr. Slade who was then Research General Manager and was appointed Research Controller in 1946.

Mr. F. G. Brewer, O.B.E., who has been Secretary to the Gas Council since its formation in 1948, will retire from that office at the end of September. The Council has appointed as his successor the Chief Accountant of the Council, Mr. Wilfrid Bailey, F.S.A.A., F.I.M.T.A.

#### Mr. T. A. McKenna

We regret that we erroneously referred to Mr. T. A. McKenna as the chairman of the Staveley Iron and Chemical Co. Ltd. in our February issue, p. 85. This should have read "Chairman of the Staveley Coal and Iron Co. Ltd." The two companies are quite separate and no longer associated, the present chairman and managing director of the Staveley Iron and Chemical Co. Ltd. being Mr. S. W. Martin.

#### **OBITUARY**

Mr. T. J. O'Shee, chairman and governing director of Kathleen Court (England) Ltd. and Sun Island Chemicals Ltd. died on March 14 aged 61. In the 1920s he emigrated to Australia and formed Kathleen Court and Amalgamated Laboratories and launched Cooltan. He became one of the largest manufacturers of medicinal products in Australia. In 1935 he returned to this country to market Cooltan. Many other products followed.

Mr. H. T. Eatwell, managing director and joint deputy chairman of G. A. Harvey and Co. (London) Ltd., died on February 20. He joined the company in 1929 as a sales engineer in their heavy construction department. He was subsequently appointed manager of that department, and later became the personal assistant to the senior director and works manager. He was appointed a director in 1937 and managing director in 1947; in addition he held the post of deputy chairman from 1959.

#### More synthetic organic chemicals liable to K.I.D.

The Board of Trade have made an Order introducing a supplementary list of synthetic organic chemicals, etc., liable to Key Industry Duty as follows.

4-Acetamido-3-nitroanisole 4-Acetamido-3-nitroanisole
2-Acetamido-4-nitrobe:zoic acid
Acet-N-n-butylanilide
1-Allyl-6-amino-ethyluracil
1-Allyl-6-aminouracil
4-Aminobenzonitrile
8-Amino-6-methoxyquinoline
2-n-Aminobenylethylamina 2-p-Aminophenylethylamine Ammonium isethionate Benzotriazole Benzotrazoie Calcium Di-pantothenate Calcium formaldehydesulphoxylate mono (Carboxymethylthio) succinic acid X-2-Chloroethyldithylammonium chloride X-2-Chloroethyldimethylammonium chloride N-2-Chloroethyldimethylammonium chloride
N-2-Chloroethyldimethylammonium chloride
N-2-Chloroethyldisopropylammonium chloride
1-(2-Chloroethyl) piperidinium chloride
1-(2-Chloro-2-hydroxybenzophenone
-(4-Chloro-2-methylphenoxy) propionie acid
N-3-Chloro-2-methylphenoxy) propionie acid
N-3-Chloro-2-methylphenoxylpropionie
Choline carbonate
Choline carbonate
Choline earbonate
Choline 8-hydroxytryptamine sulphate
4-Cyanobenzadiehyde
2-Cyclohexylcyclohexanone
2 : 7-Diamino-10-ethyl-9-phenylphenanthridinium
chloride
Di-(2-carboxymethylthioethyl) ether
Diethanolammonium a - (4 - chloro - 2 - methylphenoxylpropionate
2 : 2' - Dihydroxy - 1 1' - dinaphthylmethane
3 : 3'-dicarboxylic acid
Dipperidinomethane
n-Dodecyl thioglycollate
3-Ethyl-3-methylgiutarinide Dipiperidinomethane
n-Dodeeyl thioglycollate
n-Dodeeyl thioglycollate
3-Ethyl-3-methylglutarimide
1-Ethyl-1:2:3:6-tetrahydrophyridine
n-Hexadecyl thioglycollate
4-Hydroxybenzonitrile 4-Hymoxy benzomente 2-(2-Hydroxy-4-methoxy benzophenone 2-Hydroxy-4-methoxy-4-methylbenzophenone p-Hydroxypropiophenone Mephentermine Mephentermine sulphate 1-Methyl-2-mercaptoiminazole 1-Methyl-2-mercaptoiminazole
4-Methylpiperidine
1-Methyl-1; 2; 3; 6-tetrahydropyridine
5-Nitrofurfuryldeyde semioxamazone
1-(5-Nitrofurfurylideneamino)hydantoin
3-(5-Nitrofurfurylideneamino)-2-oxazolidone
5-Nitrofurfurylidene diacetate
2-Nonvilheed 5-Nitrofurfurylidene diacetate
y-Nonylphenol
Piperazine glutamate
Piperazine glutamate
Piperazine theophyllin-7-ylacetate
Potassium a - (4 - chloro - 2 - methylphenoxy)
propionate
Propionaldoxime
Sodium 3 - (2 - acetyl - 1 - phenylethyl) - 4 hydroxycounarin
Sodium acutholisuecinate
Sodium a (4 - chloro - 2 - methylphenoxy)
propionate
Suxamethonium bromide
Suxethonium bromide

#### New packing services

Suxethonium bromide

Tetrahydrothiophen

R. P. Scherer Ltd., whose new gelatin capsule factory at Slough was opened last April, have announced two new services.

Theophylline monocthanolamine
Thiobenzoic acid
1:4-Thioxan
p-Toludiethylamide
y-2:4:5-Trichlorophenoxybutyric acid

Strip packing can now be undertaken for many kinds of tablets and gelatin capsules. The service is, however, not restricted to these products and small components of many types can be packed in individual pockets, using bright transparent film or metal foil, which is particularly suitable for humid climates.

Liquids, pastes and creams can also be packed in plastic sachets. Individual dose sachets are creating big markets.

#### Shell Chemical appointments

Shell Chemical Co. Ltd. announce the following appointments:

Dr. E. S. Paice, manager of plastics and resins department, has been appointed deputy manager of the new Royal Dutch/Shell plastics laboratories in Delft.

Mr. R. E. McOnie, manager of general chemicals department, to be manager of plastics and resins department, London.

Mr. J. E. Garner, chemical sales manager, Midland sales division, to be manager of general chemicals department.

Mr. R. A. Taylor, detergents sales manager, Midland sales division, to be manager of Scottish sales division, Glasgow.

Mr. D. Meadow-Jones, representative, Midland sales division, to be chemical sales manager of the division.

Mr. H. E. B. Jones, representative, Midland sales division, to be detergent sales manager of the division.

Mr. K. E. C. Emsden, assistant to the chemical sales manager, Northern sales division, has been appointed plastics sales manager, Northern sales division.

Mr. J. A. Minch, who has been specialising in the sale of Epikote resins, has been appointed plastics sales manager, London sales division.

#### Change of address

Bertrand Frères S. A., formerly of 12 Rue Léon Jost, Paris 17c, have changed their address to 151 Avenue de Neuilly, Neuilly-sur-Seine.

#### Weed control conference

The Society of Chemical Industry and the British Weed Control Council are organising the British Weed Control Conference to be held at the Hotel Metropole, Brighton, from November

#### MEETINGS

#### Society of Cosmetic Chemists

April 25. "Men's Cosmetics in the U.S.A.," by Jean Martin. 7.30 p.m. Royal Society of Arts, John Adam Street, London, W.C.2.

#### Society for Analytical Chemistry

Midland April 24. Section. "Developments in the Use of Redox Indicators," by R. Belcher. 7.30 p.m. College of Art and Technology, Leicester. Joint meeting with the East Midlands Section of the R.I.C.

#### Society of Chemical Industry

#### London Section

April 24. "Some Aspects of Italian Chemical Industry," by Dr. C. Bertoni. 6.30 p.m. 14 Belgrave Square, London,

#### Liverpool Section

April 17. A.G.M., 6.15 p.m. Senate Room, Liverpool University. Hurter Memorial Lecture, "March of the Antibiotics," by A. L. Bacharach. 7 p.m. Nicholson Lecture Theatre, Liverpool University.

#### South Western Section

April 18. "Some Aspects of Inorganic Peroxy Compounds," by R. 5 p.m. Washington Singer Laboratories, The University, Exeter.

#### **Dublin and District Section**

May 14, 16 and 19. " Recent Developments in the Study of Plant-Growth Substances," by Prof. R. L. Wain. Joint meeting with the Institute of Chemistry of Ireland, the R.I.C. and the S.C.I. May 14, 7.45 p.m. in the Chemistry Department, University College, Dublin; May 16, at 7.45 p.m. at University College, Cork; and May

19, at 7.45 p.m. in the Chemistry Department, University College, Galway.

#### Corrosion Group

April 16. A.G.M. and Spring lecture. "Corrosion Research and its Industrial Background," by W. H. J. A.G.M. and Spring Vernon. 6.30 p.m. 14 Belgrave Square, London, S.W.1.

#### Fine Chemicals Group

April 18. "Organic Peroxides and their Industrial Uses," by Dr. E. G. E. Hawkins. 6.30 p.m. 14 Belgrave Square, London, S.W.1.

May 16. A.G.M. 6.30 p.m. your Research Policy really Necessary?" by Dr. B. A. Hems, 7 p.m. 14 Belgrave Square, London, S.W.1.

#### Oils and Fats Group

April 24. A.G.M., 6.30 p.m., followed by "Patterns in Lipid Chemistry," by J. A. Lovern, University of Liverpool.

#### Pesticides Group

April 21. A.G.M., 5.30 p.m. "Pesticides: Past, Present Future," by Dr. F. P. Coyne. Belgrave Square, London, S.W.1. and

#### **Royal Institute of Chemistry**

April 21. "Recent Applications of Raman Spectroscopy," by Dr. L. A. Woodward. 5 p.m. University Chemical Laboratory, Lensfield Road, Cambridge.

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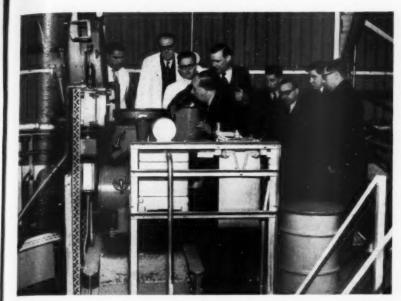
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" Naturally-occurring April 23. Acetylenes," by Prof. E. R. H. Jones. 7 p.m. College of Technology, Portsmouth, Joint meeting with the Portsmouth and District Chemical Society.

April 24. "Water-repellency," by Prof. N. K. Adam. 5.15 p.m., the Chemistry Department, University of Bristol. Joint meeting with the Student Chemical Society.



After the opening of new laboratories for the research and development departments of British Glues and Chemicals Ltd., at Bermondsey, London, the chairman and managing director, Mr. Harold J. Cotes, inspected the laboratories and experimental plant. In this picture the technical controller, Dr. D. R. Ashworth, discusses with Mr. Cotes the operation of an Alfa-Laval QX2977 nozzle-type centrifugal concentrator for protein etc. Third from the right is the director of development, Mr. I. H. Chayen.

## New Products

#### Reformulated dentifrice

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Chief advantage of the reformulated Gibbs dentifrice is said to be the complete absence of any soapy taste. It is being marketed in three flavours: peppermint, birchmint, and a new standard flavour. The attractively coloured tins retain the "Ivory Castle" motif in the design. It retails at 1s. 1d. per tin.

#### Non-slip floor polish

Cimex-Fraser Tuson have developed an anti-slip floor polish.

It is a water emulsion of a newly developed plastic polymer and is similar in appearance to water wax polish. It has been given the name of H.A.R.2, as it was the second of a series of substances tested by Harwell workers in their search for a suitable protection for the wooden desk tops and floors which were liable to penetration by minute radioactive particles. H.A.R.2 is reported to give a film life of two to three months. Remaining plastic throughout this period the film is said to be maintained in an even condition by regular buffing. The product is claimed to be unaffected by normal maintenance scrubbing, but can be removed by the use of a mild abrasive. Such complete removal, say the makers, is only necessary about once yearly.

#### Chlorhexidine dihydrochloride

The salt of *Hibitane* has now been added to the I.C.I. range of medical products

Hibitane chlorhexidine dihydrochloride is a relatively insoluble salt of Hibitane which is useful where prolonged antibacterial action is required locally. It is especially useful on sensitive tissues and is relatively non-irritating. Hibitane dihydrochloride may be incorporated into creams, powders, pastes or ointments. It can be used with antibiotics and sulphonomides.

Issued in bottles of 10 g. it retails at 10s. 6d., trade price 84s. per doz., exempt from purchase tax. A 100 g. pack is also available for hospitals only.

#### Silk powder for dry skin

Helena Rubinstein's silk face powder has been specially formulated for a dry skin so as to ensure moisture-retention in all weathers. Packed in a pink case, it retails at 11s. 6d. with refills at 8s. 3d. Another new preparation is the silk minute all-in-one make-up stated to contain the same "moisturising" ingredients. This is available in a pink and gold compact at 10s. 11d. and refills cost 6s. 11d.

#### Cough syrup

Calcidrine syrup, a combination of expectorant, bronchodilator and sedatives, has been introduced by Abbott Laboratories Ltd., for treatment of coughs. Each fl. oz. contains calcium iodide, B.P.C., 1934, 14 gr., ephedrine hydrochloride B.P.,  $\frac{3}{8}$  gr. codeine phosphate B.P.,  $\frac{1}{3}$  gr., nembutal (pentobarbitone sodium B.P.),  $\frac{3}{8}$  gr., and alcohol B.P., 28 min.

#### Antiperspirant ingredient

A new ingredient for the manufacture of anti-perspirants is sodium aluminium chlorhydroxy lactate, available from Albright and Wilson. It has been developed from aluminium chlorhydrate. Like it the new product is said to enable manufacturers to formulate anti-perspirants without the traditional disadvantages of having to incorporate buffers to avoid skin irritations and the rotting of fabrics and clothing.

The chief advantage of sodium aluminium chlorhydroxy lactate, according to the company, is its compatibility with sodium stearate. They say that this means quick and easy formulation of cosmetic preparations such as cologne sticks—most of which previously contained buffer preparations which substantially reduced the anti-perspirant and deodorising properties of the sticks.

Other applications that are suggested for sodium aluminium chlorhydroxy lactate, which is supplied in the form of a 40% aqueous solution, are in the formulation of after-shave lotions and similar preparations.

#### \*

#### Selective weedkiller

Fisons Pest Control Ltd. have introduced a new herbicide for the control of cereal weeds. A mixture of MCPA/TCB, it is being marketed as *Fisons* 18-15.

It is stated to be as effective as MCPA, 2,4-D and DNOC without having any of their drawbacks. Spring and winter barley, oats and wheat can be sprayed with the new product provided they are not undersown. Under the same conditions, say Fisons, cereals can be sprayed from the fiveleaf stage to the "running" stage. Temperatures below 45°F. do not affect its efficiency, it is reported, which means that it may be used in early spring on autumn sown crops in order to catch the weeds at their most susceptible stages.

Toxicity is said to be about the same as for MCPA and 2,4-D, so that users do not have to wear protective clothing. Game birds and other wild life are unaffected.

Since it is water soluble it requires no agitation or previous mixing and is stated to give best results when applied with a low volume machine at from 10-20 gal. per acre.

## News from Abroad

#### SPAIN

#### Chemical developments

New industries include a factory in Valencia for the production of 3,000 tons p.a. of insecticides, and a project in Jaen for the glycerin recovery of olive foot oils.

The Oxygeno works in Oviedo has applied for authorisation to manufacture dissolved acetylene. quimica (Palencia) wishes to manufacture acetone and methyl ethyl ketone.

#### PORTUGAL

#### Closer watch on drugs

New legislation has been issued governing the introduction of new pharmaceutical specialities into the Portuguese market, whether imported or manufactured locally. A technical commission for new medicaments has been set up to advise on the utility of such products. Certain advantages may be granted to products manufactured in Portugal.

#### **CYPRUS**

#### Detergent boom

Over the past four years imports of detergents have almost doubled.

According to statistics issued by the Export Services Branch, Board of Trade, U.K. firms have the biggest share of this market, having supplied the island with detergents to the value of £174,421 during the first nine Now a local months of last year. manufacturer, Larticon Synthetic Detergents Co., is going into production to help meet the demand.

Laundry soap sales are suffering an inevitable decline. One cause of this may be that the quality of locally made soap is less satisfactory than it used to be. It was originally made from olive kernel oil, but now imported oils and fats are used instead.

Most of the laundry soap imported comes from Britain; 4,856 cwt. out of a total of 4,887 cwt. was imported from the U.K. in 1956. Almost all of the toilet soap imported in 1956 also came from the U.K., 6,774 cwt. valued at £69,969.

#### BRAZIL

#### New light on action of curare

A glycoprotein-a muscle tissue chemical-is believed to be responsible for the paralysing action of curare, a Brazilian scientist told an international symposium on modern medical developments in the use of the Indian poison in Rio de Janeiro. He is Prof. Carlos Chagas, director of the

Institute of Biophysics of the University of Brazil.

Prof. Chagas's research team succeeded in isolating a chemical in muscle tissue that provides the bridge in transmission of electrical impulses from nerve to muscle. The substance is a cellular component that they identified as a glycoprotein and called Fraction X.

When an impulse originating in the brain reaches a nerve, it polarises the glycoprotein acting as a receptor and releases acetylchlorine which transmits an impulse to the muscle. process is known as synapsis.

Prof. Chagas said he is now seeking to establish whether glycoprotein also is found in the brain. Its presence there would shed new light on motor processes in the brain.

#### BELGIUM

#### Chemistry congress

The XXXIst International Congress of Industrial Chemistry will be held at Liège, Belgium, from September 7 to 20. It will be divided into 10 groups of which one will be devoted to general technical problems of the chemical industry and another to the organic chemical industries. Further information from: 32 rue Joseph 11, Brussels IV, Belgium.

#### TRINIDAD

#### Fertilisers and acid

W. R. Grace and Co. have been given pioneer status by the Trinidad Government to establish a \$19 million fertiliser manufacturing industry in the Colony.

The Trinidad Oil Co. Ltd. (now known as Texaco Trinidad Inc.) has brought into operation a new million sulphuric acid plant at their refineries at Point-a-Pierre. It is said that the plant will produce 40 tons of concentrated sulphuric acid each day by the decomposition of acid sludges from other refining processes.

#### **MEXICO**

#### Self-sufficiency approaches

Since 1940, when Mexico made only 45% of all medical and pharmaceutical products consumed there, production has been steadily increasing. In 1950 the figure had risen to 75% and last year it was 82%. By 1960 it is hoped that production will rise to 100%.

#### Fluoride plant

Du Pont are to invest a preliminary 125 million pesos in a fluoride plant which may be installed at Monclova.

#### UNITED STATES

#### Du Pont's big year of expansion

The Du Pont Co. in 1957 spent \$220 million in construction and expansion of plants, laboratories, and service units, and attained sales of \$1,965 million, both record highs for the comit was disclosed by Crawford H. Greenewalt, president, in his annual report to the more than 200,000 stockholders.

Despite decreased business activity in the fourth quarter, sales for the year were 3% above the previous record year of 1955 and 4% ahead of 1956.

Increased demand for the company's products occurred in many lines but especially in sales to the textile industry. The company's prices averaged 1% higher than in 1956; the volume of sales was 3% higher.

Net earnings from operations increased 4% over 1956, but an 8% rise in average operating investment resulted in a return on operating investment of 11% compared with 11.3% the previous year.

Total earnings were \$397 million in 1957 compared with \$383 million in 1956, including \$116 million from General Motors dividends in each of

the two years.

The \$220 million spent on new and expanded plants, laboratories, and service units was an increase from \$157 million for 1956. Due principally to this, the average gross operating investment increased from \$2,252 million for 1956 to \$2,421 million for 1957. Operating investment was \$26,900 per employee, the company having an average of 90,088 employees during the year.

New plants, Six new plants are under construction. Among the products involved in the expansion at these and other locations are nylon, Orlon acrylic staple, cellophane, titanium pigments, Alathon polyethylene resin, Dacron polyester fibre, sodium, silicon, Mylar polyester film, Texon tetrafluoroethylene resin, sulphuric acid, neoprene synthetic rubber, tetraethyl lead antiknock compound, sodium carboxymethyl cellulose, sulphamic acid, and Hypalon synthetic rubber.

The company spent \$80 million on research and development during the year, exclusive of laboratory construction and technical assistance to manufacturing and sales. Research and development were carried forward by 2,200 scientists at 30 laboratory locations. Fundamental research cost \$15 million and utilised the efforts of more than 400 scientists. The fundamental research programme covers, inter alia, organic, inorganic and physical chemistry; physics; mathematics; engineering biochemistry; microbiology.

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#### New approach to control of cancer

Frof. S. Meryl Rose, zoologist at the University of Illinois, told the annual year-end meeting of the American Association for the Advancement of Science in Indianapolis that "Cancer growth can be limited by its products. Now an attempt should be made to collect products of a cancer, concentrate them, and use them back on the cancer."

Embryonic cells can be moved and will develop to fit their new environment. Cells of many simple animals will regenerate missing parts. Following these clues, he has found that inhibitory information passes along

from one cell to another.

"In seven different kinds of organisms a mash of a part, or culture fluid from a part, has been used to suppress embryonic development of that same part. For example, we were able to produce heartless or brainless tadpoles by culturing eggs in water containing respectively pieces of heart or pieces

of brain."

Prof. Rose suggested that inhibitors produced by tissues which already have achieved a certain status prevent other tissues from developing similarly, forcing them to become something else.

This theory, he explained, could account for both benign and malignant

growths.

"Cells which have become different enough so that they are no longer inhibited by products of their parent tissue are free to grow. One would expect this new growth to be self-limiting as the concentration of its own peculiar inhibitors increased. In most cases this is true, and the growths are benign.

"Malignant tissues are composed of sickly abnormal cells which die almost as rapidly as they reproduce. There never is a great mass, and presumably never a limiting concentration of inhibitors. Some of the cancers, the ones which grow through the most tissue, never have more than a few ounces of living tissue. They are never-healing wounds, always growing, but never reaching the self-limiting size.

"Now that biologists are learning that growth can be limited by its products, the attempt should be made to collect the products of a cancer, concentrate them, and use them back

on the cancer."

#### CHILE

#### Nitrates and iodine

During the first three quarters of 1957, production of nitrate was 972,124 tons, 13% more than in the corresponding period of 1956. Profits of the principal nitrate company, the Anglo Lautaro Co., for the nitrate year ended June 30, 1957, stood at 193,412 dollars compared with 4,388,149 dollars a year earlier. The

reduction was due to strikes and a fall in the world price.

Production of iodine during the first nine months of 1957 stood at 938-8 tons, an increase of 110% over the output for the equivalent period of 1956.

#### **SWITZERLAND**

#### Dye standards

On Swiss initiative, an international organisation with headquarters in Zurich has been formed to establish standards of fastness in dyes to be publicised under the mark Felisol. This organisation includes British, Swiss, German, Italian, American and Dutch dyestuff manufacturers. Consumer publicity is planned for Switzerland, Holland, Italy and Denmark.

#### Chemical industries committee's resolution on occupational diseases

Resolutions on protecting workers against occupational diseases and poisoning and on industrial relations in the chemical industries were among those adopted by the Chemical Industries Committee of the International Labour Organisation, which finished its Fifth Session in Geneva on February 21.

The resolution on prevention of occupational diseases and poisoning in the chemical industries, which was adopted unanimously, says that the health of workers should be a primary consideration in the design of premises, plant and equipment for the chemical industries. Consultation should therefore take place at the earliest possible stage between the chemist, the engineering staff and occupational health specialists, to ensure that the design in its final form is devoid of any elements which might adversely affect health.

The I.L.O. is also to keep its list of dangerous substances up to date and to continue preparing basic information to appear on warning labels for containers of dangerous substances.

On the subject of collective bargaining, the resolution on industrial relations indicates that the employers in the chemical industries, or their occupational organisations, and workers' occupational organisations in these industries should negotiate in good faith and make every effort to conclude collective agreements.

The Committee also adopted, by 55 votes to 33, with 23 abstentions, a resolution on the protection of workers employed in atomic energy establish-

ments.

The question of hours of work in the chemical industries is to be placed on the agenda of the next session of the Chemical Industries Committee.

#### CANADA

#### Albright and Wilson expand

Electric Reduction Co. of Canada Ltd. has announced an expansion of sodium chlorate facilities in Eastern Canada which will consist in more than doubling the capacity of the company's plant at Buckingham, Quebec. Construction has already commenced, and completion date is scheduled for July At the same time, Electric Reduction's sodium chlorate plant in North Vancouver is being expanded by 50%. This was due for completion on March 31. These expansions are designed to meet the requirements of the rapidly growing pulp and paper, uranium, and herbicide industries for the next five years, and to facilitate further expansion of capacity as it is

Electric Reduction is owned by Albright and Wilson Ltd.

#### THE CHEMICAL MARKET

LONDON.—The next full price list will appear next month. There is a continued downward trend. Iodine, formerly 17s. 4d. kg., is now 15s. Lithium salts have been reduced by 1s. to 10s. lb. Silver nitrate is down from 5s. 014d. oz. to 4s. 215d. The only increase is mercury sulphide red, which was previously 29s. 3d. lb. and is now 30s. 6d. The higher priced quoted for calcium chloride, £15 17s. 6d. ton, is the delivered price. Oleine and stearine prices are down by £5 per ton. Oleine B.P. is now £165, stearic acid B.P. flake £154 and stearine flake (triple pressed) £149, all carriage paid G.B. Carnauba, prime, spot, is down by £3 to £55 cwt., and karaya, powder, spot, by 1d. to 3s. 6d. lb. Shellac, No. 1 orange, is down from £14 cwt. to £13 10s., No. 2 orange by £1 to £12 15s. cwt., and transparent white by 3d. to 4s. 6d. lb. Tragacanth, No. 1 spot is reduced by 10s. to £152 cwt. and pale leaf by £1 to £54 cwt. Three additions to our list are caustic soda, solid 1-ton lots, from £32 9s. to £34 4s. ton, soda ash 1-ton lots delvd., from £13 19s. 6d. to £16 15s. 6d. ton, and sulphuric acid, ex-works, B.O.V. 78%, from 8s. to 10s. ewt. and C.O.V. 96% from 11s. to 14s. cwt. according to quality and quantity.

XUM

## **Packaging**

#### Polythene cap for tubes

A vibration-proof polythene cap (115) for collapsible tubes has been introduced by Venesta Ltd. It is produced from special moulds and is designed on the standard octagonal pattern from which both wad and wadding have been eliminated.

Because of the natural resilience of polythene, the cap is able to grip the nozzle of a tube with great tenacity, creating an excellent seal between cap and nozzle.

Venesta are prepared to test any product to ascertain if it reacts undesirably with polythene caps.

#### Ceramic labelling

For their recently introduced hair friction, Molyneux are using a ½-oz. glass bottle with ceramic labelling. The label "copy" is silk-screened on to the glass and the impression is then fired-on to give a permanent label. For the Molyneux bottles the product name and the perfume name are printed in black. In spite of the small typefaces which have to be used on the ½-oz. bottles legibility is good.

Glastics Ltd., who made and labelled the bottles, say that good legibility is making ceramic labelling increasingly popular with perfume, cosmetics and toilet preparation manufacturers. The permanent, silk-screened product name and instructions-for-use cannot be rubbed off.

The single-application bottles are packed, in twelves, in a yellow and black dispenser.

#### New paper laminates

The Plastics Division of the Telegraph Construction and Maintenance Co. Ltd. has developed a new range of laminates combining paper, polythene and hessian.

By means of the extrusion coating technique, a hessian mesh is firmly sealed to paper with a layer of polythene which covers the mesh completely. The result is a material which is strong mechanically and proof against moisture. It will also withstand temperatures up to 140°F, without deterioration and can, for short periods, be subjected to temperatures near 200°F.

By varying the mesh, the type of paper, and the thickness of the polythene layer, a number of different laminates of this character can be made to suit individual requirements. A sandwich construction, with paper on both sides of the hessian mesh, seems to offer the greatest possibilities. Where the best possible retention of mechanical properties in damp conditions is required, paper of high wet-strength is used.



Bottles with fired-on lettering; the dispenser pack is yellow and black.

#### Polythene " jerricans " for formic acid

Formic acid in newly designed containers of polythene and hardboard is available from Charles H. Windschuegl Ltd. The containers are very strong and are specially designed for easier stacking and handling. It is stated that where freight rates are based on cubic measurements their use can result in a lower c.i.f. cost, achieving notable reductions where measurement charges are high.

The container, which holds 35 kg., is a thick polythene "jerrycan" with a screw-top pourer, encased in toughened hardboard and fitted with an external handle. When empty it can be washed and used as a container for any other liquid, including corrosives, finding particular value in areas where climatic conditions make the use of metal cans uneconomical or unsuitable.

## Industry's Publications

Butterfield News. A recent issue contains features on the manufacture of a pure nickel road tank for Imperial Chemical Industries Ltd.; techniques of welding; and the new Butterfield technical block.

Visco M.V. dry air filter. Leaflet No. 577 describes this unit which is made by the Visco Engineering Co. Ltd. It is stated to occupy about two-thirds of the space and to sell at about two-thirds the price of the company's C.E. type filter of equal capacity.

CMC information. Cooppal et Cie, the Belgian manufacturers of the Copagel range of carboxymethyl-celluloses, have issued four technical leaflets describing the uses of Copagel in: pharmacy and medicine; textile industry; soap and laundry industries; and ceramic industry. They are in English and copies may be had from the company's U.K. agents, Honeywill and Stein Ltd.

Powders. B.S. 2955: Glossary of terms relating to powders. This new British Standard (14 pp., fully indexed) defines a number of selected terms applicable to metallic and non-metallic powders. Following a definition of powder (arbitrarily decided upon as "discrete particles of dry material of size less than 1,000 microns maximum dimension") are sections containing terms associated with: types of powder, particle size, particle shape, powder properties, and powder processing.

The two appendices to the standard deal with "Mean diameters of par-

ticulate systems" and "Calculation of Stokes's diameter" respectively.

Copies of the standard may be obtained from the British Standards Institution, 2 Park Street, London, W.1, price 4s. 6d.

Formulation of shampoos. Here is a most useful book of shampoo formulae and formulation employing Marchon Products' *Empicol* products. An export pamphlet is included in the booklet giving properties and applications of *Empicol* SLE1 and SLE2.

1,4-Thioxane. Data sheets giving the properties of 1,4-thioxane are issued by Robinson Bros. Ltd., from whom development quantities of this cyclic sulphide are available.

Isomanties. Isopad Ltd. have recently published a catalogue giving descriptions and specifications of isomantles for pilot and production plant up to 2,000 gal. capacity. There are also descriptions and illustrations of several recent installations, including a production unit comprising two process vessels of 1,000 gal. cap. each.

The House of Magnus. The International edition, Vol. 3, No. 1, published by Magnus, Mabee and Reynard, Inc., of New York and Chicago, contains features on The Organisation for Trade Co-operation, Widening Horizon for Pharmaceutical Aerosols, In Hong Kong—Ed. A. Keller and Co. Ltd., and The Growing of Lemons for Lemon Oil. There it news of a water-soluble deodorans, L-37-41.

#### W TRADE MARKS

APPLICATIONS

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DEOSAN QUATMASTER.-771,323. Deosan Ltd.

NETELEX.—770,823. Shell Petroleum

FORLAY .- 771,396. Murphy Chemical Co. Ltd.

#### Cosmetics and toilet preparations

EAU DE COLOGNE FROM 4711.-703,169. Eau de Cologne and Parfumerie Fabrik Glockengasse No. 4711 Gegenhuber der Pfderpost von Ferd. Mulhens 4711.

-766,540. Thames Industries Ltd. CHERI.—B767,824. Parfums Christian

LIFEBUOY .- 768,651. Lever Bros.

Port Sunlight Ltd.

LENTHERIC BEAUTY SLEEP.—

768,911. Lentheric Ltd.
MAD MOMENT.—769,360.
Products Co. Ltd.

MASCARAMATIC .- 770,714. Helena Rubinstein Ltd.

LUSTAIR .- 771,405. Ulter (Bradford)

OUTDOOR GIRL WAKE UP.— 767,591. OUTDOOR GIRL DEEP CLEAN.—769,658. Crystal Products Co.

GRUDEL.-770,738. Grudir Produc-

LILT .- 771,025. Thomas Hedley and Co. Ltd.

#### Pharmaceuticals

LICARAN. -766,087. Union Chimique

Belge Société Anonyme. HORMOZYME.—766,531. Upjohn of England Ltd.

COBIDEC .- 766,546. Parke, Dais and

PHOCIL. -769,521. Ayrton, Saunders and Co. Ltd.

VIT.-769,793. Modern Health Products

TRANAZINE. — 769,809. Imperial Chemical Industries Ltd.

STERANABOL. — 770,716. Societa Farmaceutici Italia.

INTRALGIN.-770,798. Riker Labora-

tories Ltd. LEVMEDIC. — 771,004. LEV-PHARMA. — 769,688. Farbenfabriken

Bayer AG. EFIDONE.-771,220, Genatosan Ltd. MYCOZOL.-767,711. Parke, Davis

DORALLO .- 768,168. Ashe Labora-

tories Ltd. ASMIONEX.—770,635. NEX.-770,636. Clinical Products Ltd. UNFACID. -771,500. British Schering

SCHOUM.-756,370. Société Civile Solution Schoum et Neutadrol.

ESTALGIN.—768,786. Boots Pure Drug Co. Ltd.

KEITHON.—769,925. Astawerke AG. LEPTAVAX.—770,695. OVIGEST.— 0,697. The Wellcome Foundation Ltd. 770,697. ULTANDREN.—770,825. Ciba Ltd. CETENFORM. — 771,547, Wallace

Manufacturing Chemists Ltd.

#### **Technical Press** Review—May

Petroleum.-The £30 million expansion of the Kent Refinery of B.P. Ltd.; New Hydrofiner; Refinery Pipelaying; Constructional Materials Handling during Plant Erection; The Chemistry of Lubricating Oil and Fuel Additives.

Automation Progress. — I.E.A. Exhibition issue; Electrical Timing Instrument; Fault Location and Control for Conveyor Systems; How London Transport handles its Payroll; Temperature Control for Antibiotics; Process Control Instruments for the Smaller Firm: Towards Continuous Process Control; Punched Card Process Control.

Corrosion Technology. — Hypalon Coatings; Neoprene and Hypalon for Chemical Plant Linings; The Protection of Structural Steel Work in Chemical Plant; Vapour Phase Corrosion Inhibitors.

Chemical and Process Engineering.—Safety in a Heavy Chemicals Factory; Safety with Organic Chemicals; Chemical Engineering and Fire Hazards; Fire-Fighting Equipment in the Chemical Industry; Filtration; Chemical Engineering in Canada.

Atomics.—Ultrasonic Testing of Welds; A Year of Welding Tech-niques; Welding of Thick Steel Plates; Electromagnetic pumping of Liquid Metals-2.

Paint Manufacture—The Nature of Adhesion in Paint Films; Surface Coatings Derived from Tall Oil-I; Aerylic Resin Emulsion Paints; Adhesion of Resins to

World Crops.—World Land Utilisation; Land Classification for Irrigation Development in Iraq; Jungle Clearing in Malaya; The Problem of Flood Mitigation.

Food Manufacture.—A Bow at a Venture: Nabisco Foods Ltd.; Rapid Techniques in Industrial Microbiology-I; Jams and Preserves; Dairy Products; Aids and Adjuncts to Food Manufacture; Food Colours.

Dairy Engineering.-New Cleaning Techniques for Centrifugal Plant; Delivery Vehicles; Organising a Delivery Fleet; Record Keeping for Delivery Vehicles; Equip-ment Survey; Design Characteristics of Milk Bottle Crates.

Fibres.-Approach to Man-Made Wool; Recent Technical Developments in the making of Man-Made Fibres; Textile Industry in Israel-Developments in Textile Machinery; Processing of Orlon.

#### NEW COMPANIES

These particulars of new companies have been extracted from the daily register of Jordan and Sons Ltd., company registration agents, Chancery Lane, London, W.C.2.

Norman L. Banks Ltd. 23.12.57.
London Road, Portsmouth. Chemists, druggists, etc. £1,000. Dirs.: N. L. and Mrs. M. J. Banks.
Andre Kanitz Ltd. 24.12.57. 8
Southampton Row, London, W.C.1. To take over and continue bus. (known as Andre Kanitz) of mnfrs. of cosmetics, toilet and beauty preparations, etc. £100.
Dirs.: A. and Susan Kanitz.

Agnazing (Agricultura) Ltd. 21.12.57

Aquarius (Agriculture) Ltd. 31.12.57. 30 St. Ann Street, Manchester 2. Manfrs. of and dlrs. in air-entrained agents,

chemicals, gases, fertilisers, salts, etc. £100. Dlrs.: G. Fisher and A. G. Elliott. P. R. Noble Ltd. 1.1.58. 14-16 Eastern Esplanade, Southend-on-Sea. Chemists and druggists, etc. £100. Dir.: P. R.

Southern Farm Chemicals Ltd. 1.1.58. Wilding Farm House, North Chailey, Sussex. £100. Dirs.; S. G. Fearon-Wilson, R. A. B. Winch, and J. A. Usborne.

Herington (Chemists) Ltd. 3.1.58. 31 High Street South, Dunstable. £10,000. Dirs.: F. E. Herington, A. G. Baldock and W. E. Squires.

Rex Paste Ltd. 7.1.58. Mnfrs. of and dirs. in glues, adhesives, etc. £10,000. Subs.: Ashley Trading Co. Ltd., 90 Lots Road, London, S.W.10, J. King and G. B. Hutchings.

Hutchings.

Bio-Clinical Products Ltd. 7.1.58. 146
Bishopsgate, London, E.C.2. £200.
Dirs.: T. G. Hardy and M. Melbourne.

M.E.K. Chemicals (Purchasers) Ltd.
3.3.58. Imperial Way, Balmoral Road,
Watford. £10,000. Subs.: Patrick K.
Drury and Herbert E. Callow.

T. D. Richards Ltd. 3.3.58. Summer Lane, Birmingham. Pharmaceutical chemists ed. on in Birmingham by T. D. and P. P. Richards, etc. £3,000. Dirs.; Tegid D. Richards, M.P.S., Walter F. Radmore and Paul P. Richards.

Albert Dent (Chemists) Ltd. 3.3.58. 12 Winchester Street, Salisbury. £3,000. Dirs.: Albert and Mrs. Winifred D. M.

Thomas Hey Ltd. 3.3.58. 21 Arundel Street, Mossley, nr. Manchester. To acquire the goodwill of bus, of a pharmacy and the like cd. on by the executrix of the late Thomas Hey at Mossley, nr. Manchester and all or any assets and liabilities. £1,000. Dirs.: James, Mrs. Ann E. and Thomas Hey.

C. B. Holliday Ltd. 19.2.58. 32 Quay Road, Bridlington. To take over bus, of chemist ed. on at 21 West Street, Bridling ton, by Clifford B. Holliday, etc. £100. Dirs.: Clifford B. and Mrs. Joan Holliday and Harold Hartley.

Quick-Eze Proprietary Ltd. 19.2.58. Manfrs. of and dirs. in medicines, drugs, chemical goods, etc. £100. Subs.: P. J. Bunyan and Albert Flower, 18 Austin Friars, London, E.C.2.

Stayne Laboratories Ltd. 19.2.58. 369
Kingston Road, London, S.W.20,
Chemists and druggists, etc. £1,000.
Dirs.: Harold A. P. Miller and Francis G.

Galloways (Birmingham) Ltd. 14.2.58. 79 New Street, Birmingham 2. Chemists, druggists, etc. £5,000. Dirs.: Gordon S. and Mrs. Hilda M. Galloway.

#### NEW PATENTS

COMPLETE SPECIFICATIONS **ACCEPTED** 

#### Steroids

Preparation of steroid compounds. Glaxo Laboratories Ltd. 794,335.

Process for the production of  $9\beta$  11 :  $\beta$ epoxy-5a-steroids. Glaxo Laboratories Ltd.

Preparations of steroid compounds. Pfizer and Co. Inc. 794,158.

Steroids. Upjohn Co. 793,408.

#### Antibiotics

Process of recovering basic antibiotics. Olin Mathieson Chemical Corporation.

Streptomyein salts. Bristol Laboratories Inc. 792,978.

Tetracycline preparations. Pfizer Cor-

 $\begin{array}{cccc} poration. & 793,558. \\ Production & of vitamin & B_{12} & products. \\ Pacific Yeast Products Inc. & 793,467. \end{array}$ 

#### Soap and detergents

Detergent compositions. Imperial Chemical Industries Ltd. 794.036. W. Weiss. Detergent compositions.

793,255. Process for the production of surface-

active agents. Mo Ocho Domsjö Aktiebolag. 793,427.

Book or sachet of soap and method of producing them. Heaton and Josephy Ltd. 793,182.

#### **Dyestuffs**

Dyes of the nitro-diphenylamine series. Celanese Corporation of America. 794,176.

Dyes of the nitrodiarylamine series.

Celanese Corporation of America. 794,177. Dyes of the nitrodiarylamine series. Celanese Corporation of America. 794,178. Dyeing textile materials. Celanese Corporation of America, 794,179. Polyazo dyestuffs. Sandoz Ltd. 794,366.

Metallizable monazo dyestuffs of the benzene-azo-8-hydroxyquinolone

Imperial Chemical Industries. 794,059. Water-insoluble monoazo dyestuffs containing eyanogen groups. Farbenfabriken Bayer AG. 794,135.

Monoazo dyestuffs and process for making them. Ciba Ltd. 793,532.

Quaternary ammonium monoazo dye salts and their use. J. R. Geigy AG. 793,587.

Copper-containing triazo dvestuffs. Farbenfabriken Bayer AG. 793,495.

#### Fungicides and herbicides

Nitrosopyrazoles and fungicidal com-positions containing them. May and Baker Ltd. 793,063.

Plant growth control and herbicidal composition and process of using same. Chipman Chemical Co. Inc. 794,395.

#### Adhesives

Adhesive bonding. B. B. Chemical Co. Ltd. 793,444.

Heat sealing adhesive sheets or tapes. Permacel Tape Corporation. 793,303.

#### Fertilisers

Fertilisers and the like. Fisons Ltd. 794.355.

#### **Pharmaceuticals**

Sustained release pharmaceutical pre-arations. Smith Kline and French Laboratories. 793,475.

Production of typhoid dysentery vaccines. T. Oshiro and M. Naito. 794,019. Process for the preparation of all-trans

caratenoid compounds. Hoffman La-Roche and Co. AG. 793,236.

Process for the production of cobalamins by fermentation of culture broths with nocardia sp. (Nocardia-rucosa). Soc. Farmaceutici Italia. 794,151.

#### Miscellaneous

Filtration process and apparatus. Fisons Ltd. 793,540.

Organic nitrogen compounds and profor producing them. Parke, Davis and Co. 794,239.

Diisocyanate modified polyester foams. Hudson Foam Plastic Corporation. 789,690.

Piperazine derivatives and their pre-parations. Abbott Laboratories. 789,704. Production of animal growth stimulants.

Pfizer and Co. Inc. 790,016. Organic compounds containing phosphorus, processes for their manufacture and preparations containing them. Ciba

789,122.

Process for the production of sulphonic

Boehme Fettchemie Ges. acid salts. 787,254.

Reinforced thermoplastic materials. Microcell Ltd., D. J. Hodgson and H. Kremer. 790,367.

Phthalic acid preparation. California Research Corporation. 790,311.

Solubilising of mineral vegetable and animal oils for cosmetic and industrial purposes. I. I. Lubowe. 790,075.

Rodenticides. Associated Fumigators Ltd. 790,022.

Wax preparations. Farbwerke Hoechst A. G. Meister, Lucius, and Bruning. 788,996.

Alcohol-amine complexes. Rohm and Haas. 788,674.

Dihydric phenols and resinous products prepared therefrom. American Cyanamid Co. 788,747.

Antibacterial cellulosic material and preparation thereof. American Cyanamid Co. 788,968.

Production of water-soluble aromatic resin sulphonates. Dow Chemical Co. 788.987.

Substituted butanediol. Lilly and Co. 788,896.

Modified aminoplastic resinous com-ositions. American Cyanamid Co. ositions. 790 034

Ion-exchange resins. Dow Chemical Co. 789,951.

#### Pesticides

Herbicidal compositions. Doi: Chemical Co. 790,599.

Pesticidal compositions. Rohm and Haas Co. 792,035.

Virginia-Nematocidal compositions. Caroline Chemical Corporation. 791,818.

New patents are from the Journal of Patents; and new trade marks are from the Trade Marks Journal. In each case permission to publish has been given by the Controller of Her Majesty's Stationery Office. Each of the publications mentioned is obtainable from the Patent Office, 25 Southampton Buildings, London, W.C.2.

#### Sixty Years Ago

From MANUFACTURING CHEMIST, April 1898

#### Antiseptic shampoo

Asked if he knew of what this antiseptic shampoo is composed Mr. Mason said, "I got a friend of mine in Paris to make an analysis of it. He writes me that it was composed of substances of three different grades, corresponding to ether of petroleum, gasoline and benzine. Now benzine as you know, is important on account of its cleansing qualities, while the other substances would be used in the shampoo because of their quick evaporation. The hair wash must, my correspondent says-and you will understand me as only roughly translating his letter—pass through some chemical process to get rid of the smell. It may be treated by sulphuric acid and subsequently perfumed. My correspondent pointed out that to prepare the article I must have a chemical laboratory and be prepared to embark upon the distillation of petroleum.

Leonard Hill House, Eden Street, London, N.W.1.  Readers requiring names of suppliers of chemicals or plant should state their needs on this form, giving approximate quantities, clip it to their business notcheading and send it to the Bureau, as above. Please type or use block letters.		
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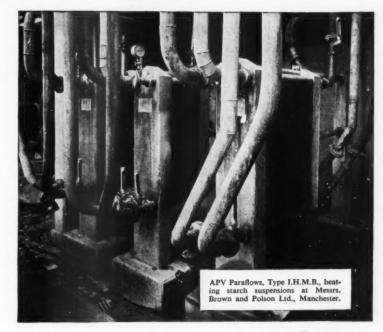
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## ... APV has the answer

The APV range of heat exchangers includes types that provide the efficient answer to innumerable processing and heat recovery problems. APV's experience in heat exchangers for corrosive, sanitary and other special conditions is unique and this experience is at your service.

#### ROSENBLAD SPIRAL HEAT EXCHANGER

This well-known heat exchanger combines low pressure drop with high overall heat transfer co-efficients. Particularly valuable in the recovery of useful heat from low value sources. Types available for sludges, viscous liquids, vapours or saturated gases with fully controlled flow on both sides. Made in a range of metals.

#### PARAFLOW PLATE HEAT EXCHANGER

The most flexible and accessible heat exchanger. Capacity and duty can be varied as required and a number of duties can be combined in one frame. Plates are of stainless steel. They can be replaced in a few minutes and are easily cleaned. Highly efficient—heat transfer co-efficients of 700/800 BTU's/sq.ft./hr./°F. are frequently obtained.



Send for full particulars to:—The A.P.V. Company Ltd., Manor Royal, Crawley, Sussex Telephone: Crawley 1360. Telex: 8737. Telegrams: Anaclastic, Crawley.

Manufacturing Chemist-April, 1958





## PROTECTIVE CLOTHING

"Have you tried Whaley Bridge?"

Opening remark, or parting shot, these few words have settled many a problem, where the protection of the product is as important as the protection of the worker.

We don't claim to know all the answers, but the technical "know how" compiled in years of service to industry, has made our products the best available. Our Company has pioneered Nylon and "Terylene" overalls.

Why not take the advice of our contemporaries and let us help with your problems?

#### MANUFACTURING COMPANY WHALEY BRIDGE

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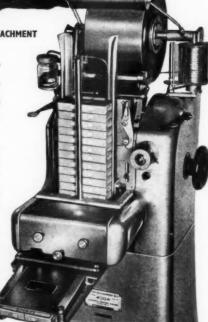
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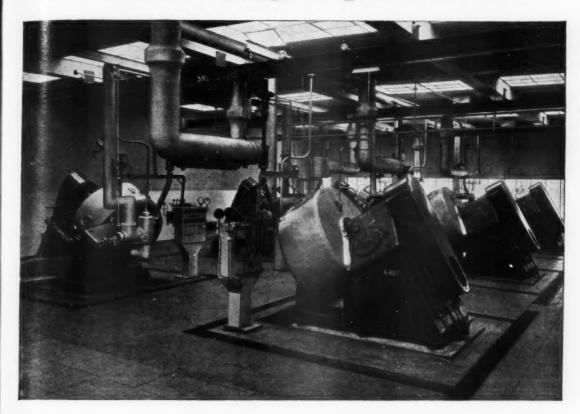
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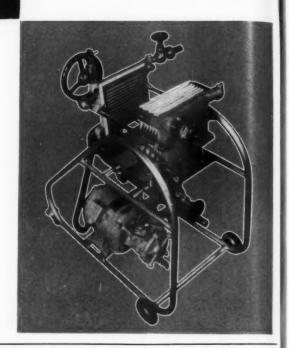
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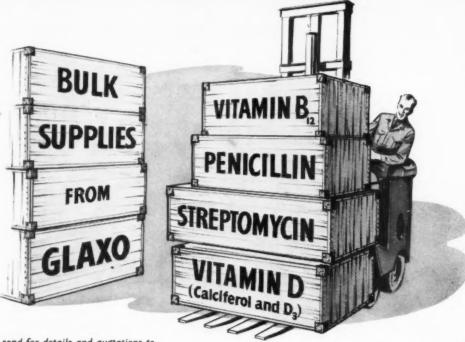
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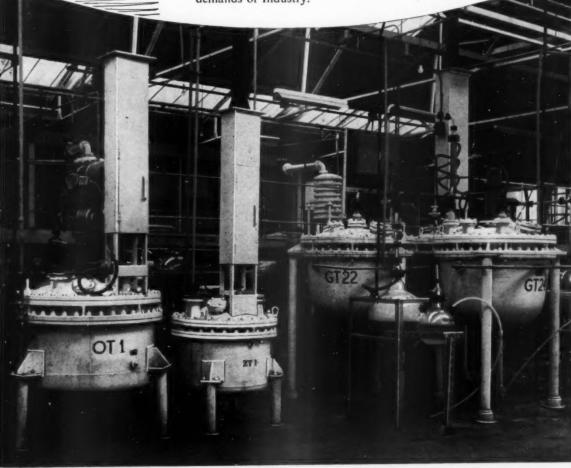
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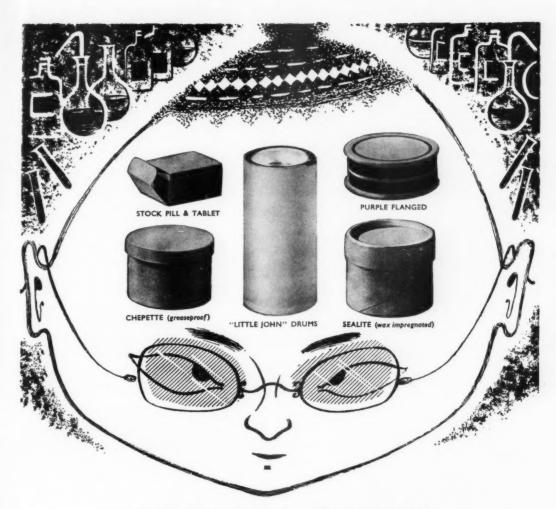
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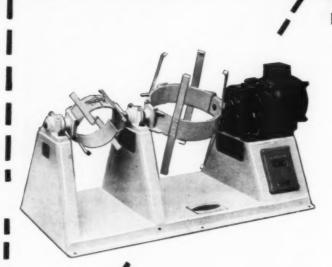
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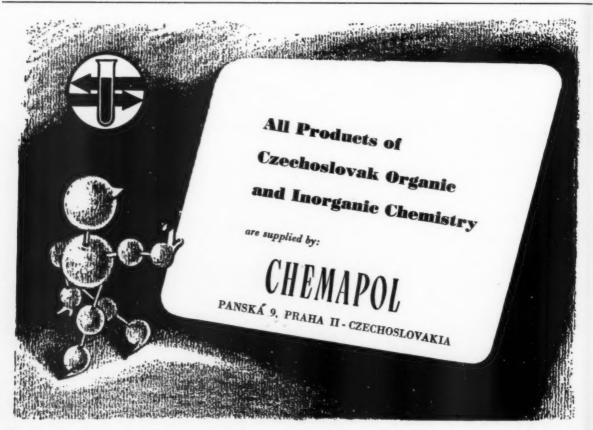
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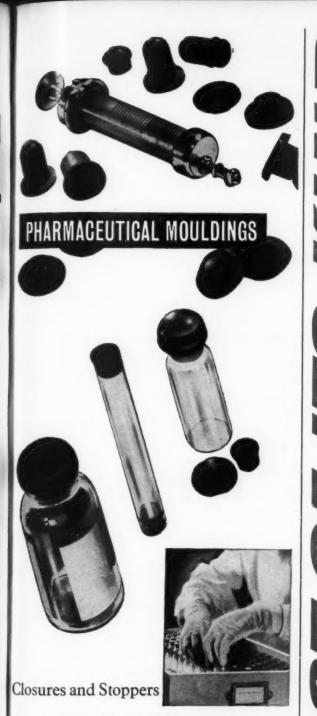
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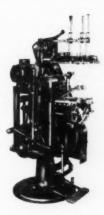


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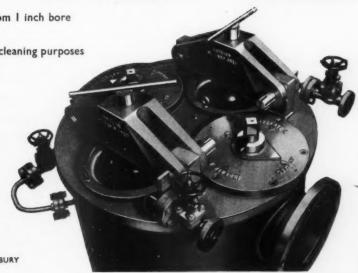
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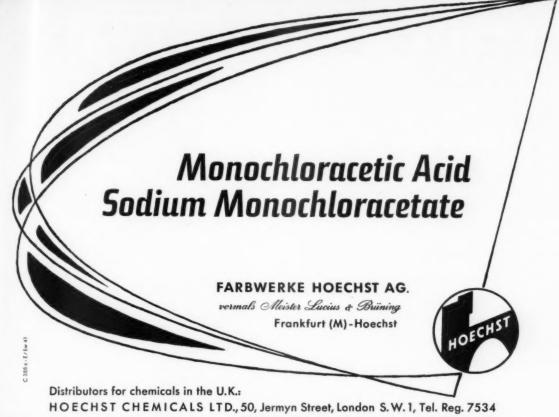
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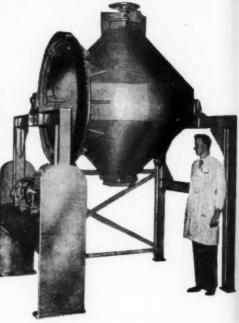
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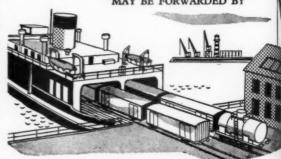


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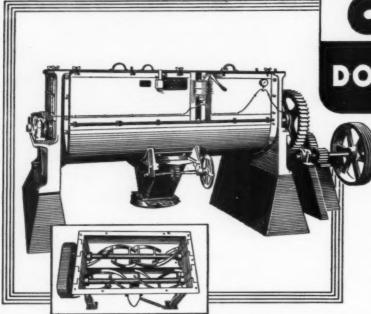
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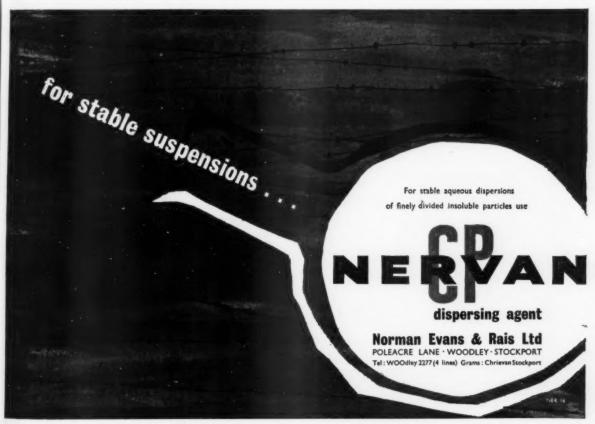


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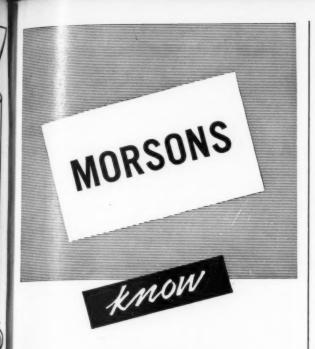


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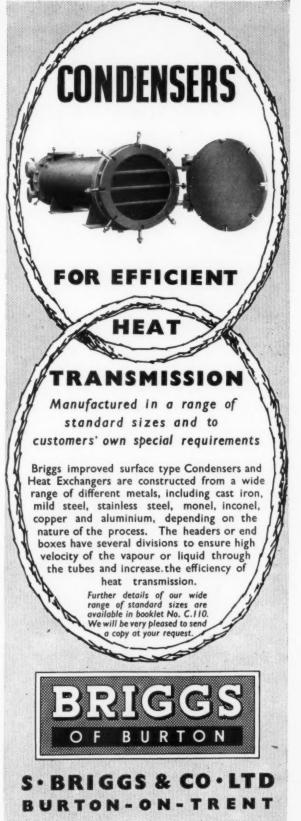
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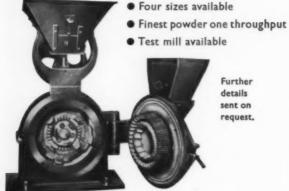
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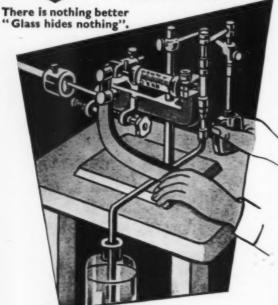
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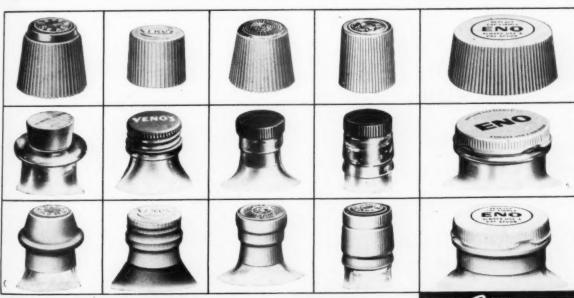
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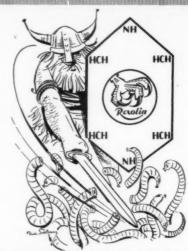
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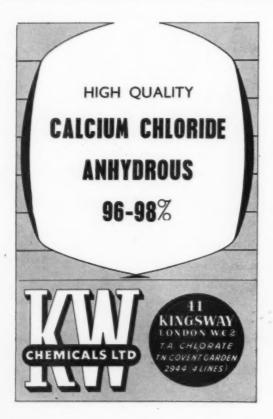
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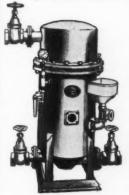
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Copies of a draft Order containing the processed additions and amendments may be

proposed additions and amendments may be obtained from the Secretary, Department of Health for Scotland, Room 230, St. Andrew's House, Edinburgh, 1.

In order to facilitate procedure at the in-quiry, any persons wishing to make representations at the inquiry are requested to inform the Department as soon as possible and to indicate as far as they can the probable scope of their representations and the length of time which they may be expected to take up at the inquiry.

I. M. ROBERTSON. Assistant Secretary

Department of Health for Scotland, Edinburgh, 1. 26th February, 1958.

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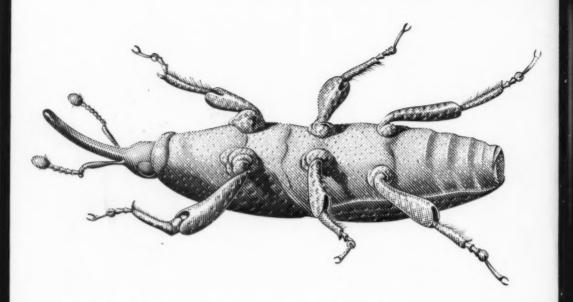






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